

DR. GREENE VARDIMAN BLACK



## Observations on the Relative Toxicity of Novocain and Cocain.

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The present investigation was undertaken as the result of the reported death of a patient who was said to have received a "small dose of novocain with suprarenin synthetic" and who died almost immediately, rolling off the table and showing marked opisthotonus. It was impossible to obtain a detailed report of this accident, but the correctness of the main facts were sufficiently attested to make it seem desirable to investigate the question of toxicity, inasmuch as novocain and suprarenin synthetics are used extensively in dental practice.

It is commonly stated that cocaine is from six to ten times as toxic as novocain. Biberfeld (Med. Klinik, 1905, No. 48) states that the toxicity of novocain is very slight (aeusserst gering) as compared with the toxicity of cocaine on cats, rabbits, dogs, rats and frogs, when administered subcutaneously or intravenously. He concludes that cocaine is about seven times as active as novocain, whatever the mode of application, and that one may accept clinical experience as showing that cocaine is ten times as toxic for man as novocain.

**Mode of  
Injection  
Important.** Piquaud and Dreyfus (Journal de Phys. et Path. Generale, 1910, No. 1) states that it is not easy to determine and compare the toxicity of various local anesthetics because of the concentration of the solution used, and the place and manner of injection

must be taken into consideration, as it is of extraordinary importance to determine how rapidly or slowly one is to inject the drugs.

They found that when they injected a solution containing 0.5 per cent. of novocain into the ear vein of a rabbit at the rate of 5 c.c. per minute, that 0.06 to 0.063 gm. x kg. was toxic. If this rate of injection was doubled, 0.042 gm. x kg. was toxic, but if the rate was slowed to one-half that first mentioned, the toxicity was diminished so that 0.9 gm. x kg. was required.

They concluded that novocain was only one-fourth as toxic as cocaine by intravenous injection, and one-sixth as toxic by intraperitoneal injection.

The literature concerning novocain is voluminous. A little volume, entitled "Klinische Berichte und wissenschaftliche Abhandlungen über Novocain," issued by the Farbwerke vorm. Meister Lucius & Brüning, contains references to some six hundred articles dealing with the subject, but these are mainly clinical.

In the present article we shall discuss the relative toxicity of novocain and cocaine, the probable causes of sudden death after the administration of moderate doses, and methods to be employed in combating such accidents without concerning ourselves with the relative anesthetic action of the two drugs, however important they may be to the pharmacologist and the dentist.

Further studies of the drug will probably be published later.

**Experiments  
on Lower  
Animals.**

Cats, dogs and rabbits were used for the present series of experiments, the results being so similar with these species of animals that the later experiments were carried out on cats almost exclusively.

As dentists use novocain by subcutaneous injection almost exclusively in combination with epinephrin (suprarenin synthetic), an effort was made to determine the toxicity of combinations of these two drugs. Reference to the protocols shows that novocain is almost non-toxic to cats in all ordinary (and even in extraordinary) amounts when administered in this way. The reason for this will become apparent when the results of the intravenous injections are examined.

*Tortoise Male Cat. Wt. 1.54 kg.*

**Experiment No. 10.**

11:15—Subcutaneous injection of 92 mg. novocain x kg. in 1 c.c. per kg. epinephrin 1-5000.

1:07—Normal; has shown no symptoms.

2:00—Eats greedily.

*Cat. Wt. 2.40 kg. Subcutaneous Injection.*

**Experiment No. 11.** 2:48,40—Injection started, 100 mg. novocain x kg. 10% sol. in 2½ c.c. epinephrin 1-1000.

2:48,50—Injection finished.

3:00—Apparently normal.

3:17—Apparently normal.

3:18—Eats ravenously.

The object desired when epinephrin is added to **Epinephrin.** novocain for subcutaneous injection is to lessen the rate of absorption into the general circulation and thereby prolong and intensify the local action on the sensory nerve endings, and possibly also to secure some synergistic action of epinephrin and novocain on the nerve endings.

The mere fact that it does retard the absorption of the novocain would lead one to expect that it would also lessen the toxicity of the latter so far as the systemic effects are concerned. The degree to which it will lessen this systemic action will depend, of course, upon its rate of elimination after it enters the blood stream.

The results of the experiments in which novocain alone was injected subcutaneously in amounts similar to those used with epinephrin show that the combined use of epinephrin does indeed lessen the systemic action to a notable degree, as shown by reference to the protocols of these experiments.

*Female Cat. Wt. 1.24 kg.*

**Experiment No. 9.** 11:02—92 mg. novocain x kg. in 10% sol. N. S.  
11:13—Violent retching; nothing evacuated.

11:17—Violent retching; nothing evacuated, as before.

11:19—Muscular weakness; walks with trembling limbs and falls when made to jump from table to floor. Marked weakness in hind legs.

11:23—Cries—then retches—but stomach empty; no evacuate.

12:10—Some weakness in hind legs, but otherwise normal.

1:07—About normal.

2:00—Too nauseated to eat.

*Male Tiger Cat. Wt. 1.96 kg. Subcutaneous*

**Experiment No. 12.** injection.

2:41,28—Injection commenced, 100 mg. x kg.  
2 c.c. 10% sol. diluted with ½ c.c. N. S. sol.

2:41,30—Injection completed.

2:42—Pulse normal.

2:48—Nausea and muscular relaxation.

2:55—Control of hind legs weakened.

2:57—Considerable lack of muscular co-ordination.  
3:04—No change from above.  
3:17—Nausea still continuing.  
3:19—Will not notice food.  
3:50—Eating, and approaching normal.

**Slow and Rapid  
Injecting.**

The relatively slight toxicity of novocain for cats by subcutaneous injection suggested that the studies could be carried out much more conveniently by injecting the drug intravenously in such a way that the rates of injection could be controlled. These experiments are divided into two groups, which for convenience are designated as rapid and slow injections.

We are abundantly able to confirm the statement of Piquand and Dreyfuss with regard to the importance of the rate of injection in determining toxicity. This is a matter of importance with almost all drugs, but there are comparatively few in which it appears to play such an important rôle as in the case of the local anesthetics, and especially of novocain.

Reference to the protocols serves to show that while no healthy cat was killed with less than 40 mg. of novocain x kg. of body weight (corresponding to about 40 grains for a human adult), the effects of as little as 20 mg. x kg. of body weight (corresponding to 20 grains for a man) indicate that the sudden entrance of such a dose into the circulation would be extremely dangerous and might prove fatal.

*Novocain, Toxicity, Cat. Female, wt. 1.74 kg.*

**Experiment No. 6.** 11:33, 15—25 mg. novocain x kg. in 5% saline, femoral vein.

11:33, 20—Heart stopped (because imperceptible to finger). Cat struggled for about two minutes and then soon became about normal.

11:48, 22—Injected 25 mg. novocain x kg. as previously.

11:48, 27—Heart imperceptible, heart beat returning in about a minute, respiration becomes thoracic almost instantly, then interrupted.

11:50—Respiration and heart beat about normal. Symptoms about as previously.

12:32, 47—Injected 40 mg. x kg. vein.

12:32, 52—Heart beat becomes imperceptible for about one minute.

12:34, 30—Heart beats irregularly, alternating, etc., sometimes rapid, sometimes slowly.

12:36, 15—Clonic convulsion, respiration mainly or wholly due to spasm of diaphragm, respiration soon ceases.



12:37—Heart beat perceptible only by carefully observing movement of hairs above it.

12:40—Heart has stopped beating, 2 minutes after cessation of respiration.

*Rabbit. Wt. 2.06 kg.*

**Experiment No. 13.** 2:15—Injected 20 mg. x kg. of 10% solution novocain in N. S., injected intravenously in ear vein.

2:15,07—Gradual stretching of limbs, followed by convulsions and falling on side.

2:15,25—No respiration.

2:16—Respiration resumed.

2:17,35—Able to get about, but stiffness in hindlegs, peculiar twitching, no reflexes.

2:18—Marked improvement, able to get about, but with some difficulty.

2:19—Getting about with some slowness, pain reflex present.

2:20—Movements slightly sluggish, but practically normal.

2:21—Entirely normal in appearance.

March 4, 1915. *Novocain Toxicity. Cat. So-*

**Experiment No. 17.** lution C (novocain 1-100 N. S.) Female tiger, wt. 2.3 kg. Ether for operation, exposure femoral.

11:30—Began injection (2.0 mg. novocain x kg. x min.)

12:30—Heart 180; respiration 38, irregular (about 120 mg. x kg. total).

12:45—150 mg. x kg., twitching about head and ears, respiration shallow, heart 180.

1:00—180 mg. x kg., some tendency toward convulsion apparent.

2:43—Risus sardonicus, twitching in head and ears; there has been some interruption of injection.

3:00—Cat has received 372.5 mg. x kg. of novocain and shows great depression. Interrupted injection for 20 minutes.

3:20—Injected rapidly 35.5 mg. novocain x kg. in about 1 c.c. N. S. Heart beat became imperceptible to the finger in about 11 seconds; convulsion, with rapid recovery of pulse and respiration; breathing was labored for several minutes.

3:24—General appearance about normal.

A few minutes later the cannula was removed, the vein tied, the wound sewed up and the cat released. The gait was disturbed for a time, as the cat had been tied in extended position for more than four hours. A little later it walked about normally and ate food within an hour.

March 5th. Animal appears normal.



Note that the animal received about 372 mg. x kg. by vein in four hours, and that within twenty minutes of the completion of that injection it had so far recovered its normal condition that the sudden injection of nearly the fatal dose had no greater effect than the same dose usually has on a normal animal. In other words, the cat was virtually normal within twenty minutes of the completion of injection of 372 mg. x kg.

Total amounted injected, 408 mg. x kg.

*Male Cat, white. Wt. 1.96 kg. Solution D.*

**Experiment No. 7.** Novocain 1-1005% phenol was applied to skin and vagi exposed and cut and femoral vein exposed. Some respiratory distress from mucus.

1:20 P. M.—40 mg. novocain x kg. in 5% sol. by vein. Heart stopped in about five seconds, and there was a few feeble beats at irregular intervals thereafter. Respiration ceased almost at once, and there was no further manifestation before death. Evidently the minimal fatal dose administered in this way affects the heart directly and the respiration almost equally. Symptoms described here vary somewhat in the different cases, but in general they were much alike, except in the intensity of the reaction. Evidently the stoppage of the heart is not due to vagus stimulation, as one would be inclined to suppose from the fact that the heart stops after the vagi have been cut and then begins to beat again.

We can also confirm the statement of Piquand and Dreyfuss relative to the greatly diminished toxicity of novocain with slower injections, but their results are far from indicating the real toxicity of the drug with a very slow administration.

Reference to the protocols of Experiment No. 17 shows that as much as 408 mg. of novocain per kg. of bodyweight (corresponding to a dose of 408 grains for a man) may be injected intravenously into a cat within a period of about four hours without causing death, and, indeed, without causing more than temporary injury, but we wish it distinctly understood that we do not say that even smaller doses might not be very injurious *indirectly* in ways that we have not determined. Our results apply only to the conditions of the experiments.

That the direct effects of the injections of such truly colossal doses of novocain on the heart and respiratory system are only fleeting is shown by the results of this experiment (17), in which an animal received almost the full fatal dose of novocain at a single injection after an interval of twenty minutes following the slow injection of 372.5 mg. x kg. of weight. This dose caused symptoms indistinguishable from those induced in those cats which had previously received no novocain—in other words, within twenty minutes after the injection of 372.5 mg. of

novocain x kg., the animal had become apparently normal, and behaved toward further injections of the drug exactly as a normal animal. This points conclusively to the rapid elimination of the drug or its fixation in the tissues in such a way that it no longer exerts its typical effects on the heart and respiratory system.

From the results of these experiments it is obvious that one cannot speak of the fatal dose of novocain for an animal without clearly defining the conditions of the experiment; since 20 mg. x kg. of weight may be distinctly dangerous and 400 mg. x kg. may be survived without apparent injury.

The toxicity of cocaine was not determined as accurately as that of novocain, but the experiments serve to show that this varies within narrower limits

**Experiments with Cocain.** than that of novocain with the varying rates of administration. Reference to the protocols of experiments shows that as little as 15 mg. of novocain x kg. of bodyweight may prove fatal to a cat when the injection is rapid, and that as much as 40 mg. per kg. may be survived in some cases when the injection is made slowly. In one experiment (No. 28) a cat required no less than 83 mg. of cocaine hydrochlorate per kg. by the vein within a period of four hours and forty-four minutes to cause death. In this case it seemed almost certain that less cocaine than that injected would have proved ultimately fatal, hence our experiments do not determine the maximum and minimum toxicity of cocaine by different methods of administration, but it is also obvious that one cannot speak of a definite toxicity of cocaine without reference to the mode of administration, and it is possible to kill an animal with a dose of novocain administered rapidly by the vein which is smaller than the largest dose of cocaine that may be survived if administered slowly by the vein. It might be put somewhat differently, as follows: If equal amounts of cocaine and novocain are administered in such a way that the cocaine is absorbed very slowly and the novocain very promptly, death might follow from the novocain and no injury result from the cocaine.

**Experiment No. 30.**      *Female Cat. Wt. 2.58 kg. March 18th.*

1:48, 30—15 mg. x kg. cocaine HCl in 10% sol.

1:48, 40—Convulsions, heart and respiration ceased.

1:48, 50—Respiration beginning again.

1:49—Heart beating feeble.

1:50—Gasping.

1:51—Death.

Résumé: 15 mg. x kg. at once fatal.

*Male Cat, tiger stripes. Wt. 2.52 kg.*

**Experiment No. 31.** 1:21 P. M.—1 mg. cocaine HCl x kg. 1 per cent. femoral vein, no perceptible effect.

1:30—10 mg. cocaine HCl x kg. 1 per cent. femoral vein. Clonic convulsions, respiration irregular, embarrassed, heart slow and feeble.

1:35—Heart rapid, respiratory distress and clonic convulsions continue.

1:38—Convulsion (none afterward), heart and respiration becoming normal.

2:00—10 mg. x kg. as before. Opisthotonus, clonic convulsions, resp. distress; heart becoming imperceptible at once.

2:00, 30—Heart beats.

2:02, 30—Clonic convulsion beginning in head, spreading to body.

2:20—10 mg. as previously; was normal; symptoms as before.

3:00—Nearly normal; wound closed; animal released; lies prone, unable to walk; fore and hind limbs laterally extended, indicative of extreme weakness; responds to calling.

Résumé: 30 mg. x kg. in 50 minutes; 31 mg. x kg. in one hour.

March 19th—Appears normal.

March 22d—Appears normal; 31 mg. x kg. not apparently injurious (?)

*Male Cat, tiger stripes. Wt. 2.58 kg.*

**Experiment No. 32.** 2:06 P. M.—2.5 mg. cocaine HCl x kg. in 1% sol. femoral. One deep respiration at once; and respiration interrupted for 10 seconds about 30 seconds after injection; heart rate about normal, but weak.

2:08, 15—Heart faster and stronger.

2:11—12.5 mg. cocaine x kg. (cat being normal), 10% sol. Heart and respiration stopped in about 20 seconds; heart resumes in 20 seconds and respiration in 40 seconds; twitching about face 90 seconds after injection; clonic convulsion and opisthotonus after 2 minutes.

2:38—Appears normal.

2:39—12.5 mg. x kg. as before, respiration ceased at once. Heart rapid, weak, respiration returns in 45 seconds; clonic convulsion after 1 minute; several times repeated.

2:45—Recovering.

3:06, 30—12.5 mg. x kg. as before, symptoms much as after previous dose; violent clonic convulsions for 5 minutes, when heart was rapid, weak and irregular.

3:30—Wound closed; animal released; violent clonic convulsions at once and less severe in next 15 minutes; cannot stand.

March 19th--Animal is hyperexcitable slightly; apparently very weak.

March 22d--Animal apparently normal, except that it does not take food or water, and has taken none since injection.

Résumé: *40 mg. x kg.* in 1 hour of cocaine HCl vein, lasting nausea.

Of course, this is not understood as an argument that novocain is not less toxic than cocaine; it merely illustrates the necessity of controlling the rate of absorption in any case where either of these drugs is used for its local anesthetic action.

Our protocols show that in nearly every case the heart and respiration cease almost simultaneously, and even where they do not cease at the same time there is no reason to doubt that the heart and respiratory centres are affected to an almost equal degree. The actions on the heart and respiratory centres are independent, because they come on in about five seconds, that is, before any effects of circulatory disturbance could materially influence the respiratory centre, and before respiratory failure could influence the heart.

**Methods of  
Combatting  
Accidents.**

The nature of the toxic action of novocain makes it apparent that sudden death may result then from the cardiac or respiratory failure, and efforts were made to determine the best methods of combatting this accident.

Owing to the rapidity of the action it is obvious that any measures of relief must be instituted without loss of time; hence only those measures were considered which could be applied at once under the conditions obtaining in the offices of dentists.

**Respiratory  
Failure.**

Respiratory failure obviously calls for artificial respiration, and every dentist who uses a local anesthetic should be familiar with the Schaeffer method of artificial respiration, and in case of respiratory failure, artificial respiration should be begun at once and conducted until spontaneous breathing begins.

**Cardiac  
Failure.**

Cardiac failure is a more formidable condition, and the only method of combatting this accident that we can recommend, as the result of our experiments, is the injection of epinephrin directly into the heart. For this purpose a reliable specimen of epinephrin should be kept at hand and a small amount injected at once if the heart stops suddenly.

We have already stated that the heart and respiration ceased almost simultaneously in the cat, and one might be inclined to argue that it would be useless to carry on artificial respiration alone in case of accident in man.

So far as one can deduce from experiments on animals, moderate doses of novocain will not cause either cardiac or respiratory failure in perfectly normal man, but the fact that death does occasionally follow moderate doses would seem to indicate that in such cases the heart or the respiratory centre is not quite normal, and in that case the drug will probably exert its action on whichever of these two structures is abnormally susceptible, and there is no reason to suppose that in any given case both the heart and the respiratory centre will exhibit any such extraordinary susceptibility to the action of the drug; therefore, if we can maintain an artificial respiration or can stimulate the heart to maintain the circulation for a few minutes, in case of accident, the drug will be eliminated from the circulation and the patient can be restored.

**Experiments with Epinephrin.** The degree of antagonism between epinephrin and novocain is not great, but the protocols of Experiments 24, 25, 26 and 27 show that under its influence some animals survived at least 50 per cent. more than the normally fatal dose of novocain.

*Novocain. Epinephrin Antagonism. Tiger and Experiment No. 24.* white male. Wt. 2.59 kg. Ether to operate only.

Cannula into femoral vein.

11:54, 05—Ep. 1-50,000 into femoral begun.

11:54, 35 to 11:55—50 mg. novocain x kg. in opposite femoral vein; respiration ceased at once and artificial respiration begun.

12:02—Artificial respiration stopped and diaphragmatic respiration begun, feebly at first, as usual.

12:03—Heart feeble and irregular.

12:04—Death.

*Maltese Male. Wt. 3.38 kg. Ether anesthetic, Experiment No. 25.* tracheal, femoral and carotid (for b. p.).

1:58, 30 to 2.05.30 Ep. 1-100,000 fem. vein, 22.5 c.c. total.

1:59, 30 to 2:00—50 mg. novocain x kg. vein (during injection of Ep.).

2:04—Artificial respiration for short time, then spontaneous respiration.

2:19, 30 to 2:24, 15—18.4 c.c. total ep. 1-100,000 injected femoral.

2:20—60 mg. novocain x kg. vein in 30 seconds in 10 per cent. sol. Respiration and heart stopped almost at once, cardiac massage and artificial respiration were begun. The spontaneous heart beats began in about 30 seconds.

2:36—Spontaneous respiration.

2:32, 30 to 2:37—Epinephrin injected, about 11 c.c. total

2:52, 49 to 2:53—40 mg. novocain x kg. in 10% solution by femoral; heart stopped almost at once, the respiration continuing about 10 seconds; heart resumed beating for 2 minutes and 30 seconds.

2:55, 40—Heart has stopped.

2:57, 40—Massage, artificial respiration and epinephrin ineffectual, being continued about 1 minute and 30 seconds.

**Novocain Epinephrin—Antagonism of Toxicity.**

*Male Cat. Wt. 2.94 kg.*

**Experiment No. 26.** 3:45 P. M.—0.33 mg. epinephrin x kg. by vein.

3:45, 10—60 mg. novocain x kg. by vein in 10% solution; heart stopped almost at once; convulsions in about 40 seconds.

3:46—Cardiac massage, few spontaneous beats.

3:52—Death.

*Male Cat. Wt. 3.9 kg.*

**Experiment No. 27.** 4:10, 20 P. M.—12 c.c. total epinephrin 1-50-000 by vein.

4:11, 50 to 4:11, 55—60 mg. novocain x kg. by vein. Heart and respiration stopped at once; convulsions. Artificial respiration and cardiac massage; recovery.

4:16—Clonic convulsion.

4:33, 40—40 mg. novocain x kg. Heart stopped in 5 seconds, respiration ceased in about one minute.

4:34—Heart beats feebly.

4:35, 40—Occasional feeble diaphragmatic respiration.

4:36—Respiration ceased.

4:38, 40—Heart stopped.

This animal and the one used in Experiment No. 25 survived a dose of 60 mg. x kg. with epinephrin, artificial respiration and cardiac massage, and later succumbed to 40 mg. x kg., though experience shows that the interval sufficed for complete recovery from the effects of the first dose.

The value of artificial respiration does not require argument, but since the heart failed in every case when excessive doses of novocain were given to the normal cat, and since the respiratory centre was also restored in those cases where epinephrin and artificial respiration were employed, we are justified in supposing that artificial respiration played its rôle in such cases, even though the nature of the experiments prevented the testing of the effects of artificial respiration alone on the centre.

Since it is impossible to obtain animals suffering from cardiac dis-

ease and respiratory disturbances such as man frequently suffers from it was decided to try the effect of novocain on cats in which the circulation and the respiration were disturbed somewhat from hydrated chloral, cats showing marked susceptibility to that drug.

**Novocain Toxicity in Presence of Chloral Poisoning.**

*Black and white female cat. Wt. 1.54 kg.*

**Experiment No. 38.** 3:23 P. M.—0.1 gm. hydrate chloral x kg. vein. Immediate depression, followed by moderate narcosis.

3:36, 30—30 mg. novocain x kg. vein, 10% solution; heart very slow in 15 seconds; respiration ceased 20 seconds after injection. Convulsion of head and forelegs; slight opisthotonus.

3:43—Gradual recovery, apparently normal. Put to death.

**Novocain Toxicity in Chloral Poisoning, Cat.**

*Male Cat, tiger stripes. Wt. 3.12 kg.*

**Experiment No. 39.** 11:47—0.2 gm. hydrated chloral x kg. by stomach.

12:30—Deep narcosis.

1:25—Narcosis apparently not so deep.

1:45—Tied on board; roused somewhat.

1:47 to 4:05—106 mg. novocain x kg. 1-200. Injection stopped.

No twitching, no urination, no change in respiration or palpable cardiac action during 2 hours and 8 minutes. Obviously, moderate narcosis with hydrated chloral does not invariably render the animal more susceptible to novocain.

*Male Black Cat. Wt. 2.76 kg.*

**Experiment No. 39 A.** 10:00 A. M.—0.2 gm. hydrated chloral x kg. stomach, deeply narcotized. Carotid cannula inserted for b. p.

10:42—Normal tracing taken.

10:44—10 mg. novocain x kg. femoral. Respiration interrupted for 20 seconds; slight rise followed by fall in b. p.

10:47—3.6 mg. novocain x kg. rise of b. p. with cessation of respiration. The rise of b. p. was evidently asphyxial in origin.

10:48 to 11:07—Approximately similar doses repeated frequently with analogous effects in every case.

11:07—8 mg. novocain x kg. Effects as previous, except greater fall in b. p., following a rise.

11:10—3.6 mg. novocain x kg. Death. Cardiac and respiratory failure simultaneous. Massage ineffectual.

Résumé. 48.9 mg. Novocain x kg. in 28 minutes, proved fatal.



*Maltese Male. Wt. 2.94 kg.*

**Experiment No. 40.** 10:00 A. M.—0.2 gm. hydrated chloral x kg., deep narcosis operation, as in previous.

11:32—10 mg. novocain x kg. vein; slight fall in b. p.; respiration interrupted for 10 seconds with slight asphyxial rise of b. p., followed by gradual cardiac and resp. failure.

11:35—Death. Artificial respiration and massage ineffectual.

The protocols of Experiments 39A and 40 show that hydrated chloral does indeed markedly diminish the resistance to novocain, at least in some cases, and as little as 10 mg. of novocain per kg. may then prove fatal if thrown rapidly, directly into the circulation. The increased susceptibility of the respiratory centre is especially marked under these circumstances. The results of Experiments 38 and 39 show that the synergism between novocain and hydrated chloral is inconstant. It probably depends on the previous injury of the respiratory centre by chloral. This lends some support to the contention that sudden death following the administration of moderate doses of novocain or cocaine are probably attributable to some abnormal condition of the heart or respiratory centre, indicating the necessity for ascertaining the condition of those organs before using a local anesthetic.

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### **Eastman Dental Dispensary.**

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The entire dental profession will share with their confrères in Rochester their great pleasure at learning that Mr. George Eastman, head of the Eastman Kodak Co., has promised to that city a dental dispensary similar to the Forsyth Dental Infirmary.

This announcement was made on July 20th, at the meeting of the Rochester Dental Society, the nature and terms of the gift being outlined in the following address made by Dr. Wm. W. Smith.

#### **Address of Dr. Smith.**

Through the generosity of George Eastman and the active interest of several prominent business men of this city, the Rochester Dental Society is about to realize an ambition which it has entertained for some years, and toward which it has been working steadily. Indeed, what has been done is far ahead of what any of the members of the Dental Society had dared to dream, for Rochester is to have a dental dispensary second to none in the country, and the only one of its kind except the Forsyth Dispensary in Boston.

The building will be three stories, of handsome design, and will cost about \$300,000, fully equipped and including land. It will be provided with every convenience for advanced dental study and the carrying on of educational and research work. There will be about twenty chairs with competent operators at the start, and room for more as the work progresses. Provision will be made for performing all operations in oral surgery, all surgical and other treatments of the nose and throat when the condition of these organs is associated with oral diseases. Orthodontic work will be a special feature, as it has come to be known that narrow and contracted jaws and irregular teeth are a serious handicap to the child. The correction of these abnormal conditions is very important.

**Laboratory for Research.** A fine research laboratory is to be provided, where special attention will be given for studying the causes and effects of diseases of the mouth and teeth.

There will also be a radiograph laboratory for X-ray work, which work is becoming very important in diagnosing dental diseases, and provision will be made for the extraction of teeth by the use of anesthetics. A very complete and perfect system for sterilizing all dental instruments will also be installed.

A fine lecture room, constructed with special attention to its acoustic properties, and an amusement room will be attractive features of the structure. Here the children will be entertained, and under the guise of amusement they will be taught the necessity for cleanliness in the care of their teeth. There will be regular courses of lectures for the internes and members of the staff, and a training school will be established for women who are preparing to take up prophylactic work. In time, it is planned to send these women into the schools of the city to do this work and to instruct the children as to the necessity for taking care of the teeth, thus opening up a new field for young women. This institution will be an ideal place in which they may qualify for this service. In some of the Eastern cities this school work has become an important part of preventive philanthropy, and there are places where no contagious diseases have been communicated among the children who are under proper dental care.

**Site in Main Street East.** The building will be erected in Main Street East, near the corner of Alexander Street, on the vacant lot between the chapter house of the Theta Delta Chi Fraternity and the residence of Edward McSweeney. It will also have an opening on Kenilworth Terrace, made possible by the purchase of a house and lot at the northwest corner of the

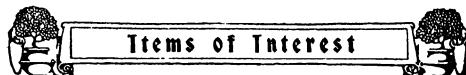
street. Plans for the buildings have been prepared by Gordon & Madden, and it will be the most complete of its kind in the world.

For several months Mr. Eastman has been deeply interested in the subject of preventive dental work among children. He went as far as to visit the Forsyth Dispensary in Boston, one of the greatest institutions of its kind, and carefully studied its work, and the more he understood the scope of the work the more deeply interested he became. Then, after conference with William Bausche, who has always taken the keenest interest in this work, and a committee from the Rochester Dental Society, he made the proposition to the society that he would build and equip a dental dispensary at a cost of from \$250,000 to \$300,000, this conditioned upon the willingness of the city to furnish at least \$20,000 a year for five years, an amount sufficient to carry on the prophylactic work in the schools; that private citizens contribute \$10,000 a year for five years, and Mr. Eastman himself would contribute \$30,000 a year for five years. At the end of that time Mr. Eastman will furnish an endowment of \$750,000 if these conditions have been met and the work is being carried on satisfactorily. He will then have paid into this enterprise over one million dollars.

The work has been thoroughly outlined and every detail has been gone into with Mr. Eastman. **Superintendent to be Engaged.** A superintendent will be engaged very soon and a search is already on for a man who will be perfectly competent from a professional standpoint and big enough as an executive to fill this position. The work will be under his supervision from the very start, much the same as the work of the public libraries was developed under a newly appointed superintendent.

The work of the Rochester Dental Society looking toward a dispensary has been intelligent and persistent. The necessity for a place to take care of the teeth of the worthy poor of the city, especially the children, was early recognized, and the first institution of its kind was established at the Rochester City Hospital by members of this society some twenty-eight years ago and continued for two years, then abandoned because of lack of support.

A few members, however, refused to be balked, and persisted in the feasibility of re-establishing such an institution. A committee was appointed, and, after serving several years, reported that Captain Lomb would advance a sum of money sufficient to equip a free dental dispensary, to be the property of the society. On receipt of this report the committee was empowered to secure accommodations with some of the hospitals, but none was able to offer quarters with a suitable light and other essentials. Through the courtesy of the Public Health Association



this dispensary was located in its rooms, the association furnishing rooms, heat and electricity free to the Dental Society. This dispensary has been in successful operation ever since.

**Chartered by  
State Board.** The sum of \$600 was tendered the society and was deemed sufficient, but through donations from local merchants, dental manufacturers and dealers, an equipment valued at \$1,200 was secured free from all indebtedness. A charter was obtained from the New York State Board of Charities, and the dispensary opened to the public on Washington's Birthday, February 22, 1905. It was kept open two afternoons each week, and twenty-four members alternated in attendance the first year. Captain Lomb then offered to pay the salary of one or more dentists who would be present each week day from 2 to 5 o'clock.

The Rochester Dental Society has been a pioneer in this work in this country. The first dental dispensary in any school in the United States was established in No. 14 School, in this city. Since that time the work has been taken up in the schools of many other cities, appropriating varying amounts from public funds for maintenance. Detroit has appropriated this year the sum of \$30,000. The splendid gift of William Bausch made possible a complete equipment for No. 26 School, and recently Albert E. May offered to establish a dispensary in No. 18. Other public-spirited citizens have made like offers, especially in the case of No. 9, but these offers have not been considered, owing to the completion of the present plans. It has been decided that more efficient work can be done in this central dispensary, but trained workers will be sent to the schools with portable outfits for doing hygienic work, who will train the children in the care of the mouth and teeth.

**Encouraging  
to Society.** It will be remembered by many that when the actor, William Hodge, was in this city some years ago, he offered to give \$1,000 to the charity which a committee should select as the most worthy. The committee reported in favor of the Dental Dispensary. This was another gift which helped to encourage those who were looking forward to the larger development of the work.

The dedication of the Forsyth Dental Infirmary, the work of which so impressed Mr. Eastman, took place last November and marked an epoch in dental history. At that time, Thomas Alexander Forsyth said:

"It has been my wish that the Infirmary should be as a home to the children, beautiful and cheerful, a protector of their health, a refuge in their pain. By making them healthier and happier, I hope it may make

them grow to be better citizens of our beloved Boston. If this is accomplished, as I believe it must be, with the co-operation of the dental profession, I shall feel that the gift has been well bestowed."

This is the idea that Mr. Eastman has in mind when he makes this princely gift to the children of Rochester, to the children who, for one reason or another, cannot meet the expense of expert dental work, many of whom suffer all through life because of neglect of their teeth.

The Forsyth building is partly of marble, and  
**Boston Dispensary** has been beautified especially since it is a memorial  
**Highly Prized.** to James Bennett and George Henry Forsyth,

brothers of the two Forsyths who erected it. There are many in the city of Boston who are of the opinion that never in the history of the world has money been so wisely expended as in this philanthropy. It has proved to be an uplift to the dental profession and will advance its power for efficient service.

The Rochester Dental Dispensary will serve the same purpose, and will prove one of the most far-reaching philanthropies ever advanced in this city. The number of diseases which may be traced to the teeth is increasing. The whole life of a person may be wrecked by neglect of the teeth in early youth. We are coming to understand this truth more perfectly, and Rochester is taking its place as a pioneer in the advanced work of prevention which comes from a better understanding of the teeth and mouth. The names of the trustees interested in this enterprise will be published later.

**Condition  
Fulfilled.** Mr. Eastman's second provision that citizens contribute ten thousand dollars per year for five years has been more than provided for, as thirteen

men have pledged themselves to give one thousand dollars each per year for five years, making a total of sixty-five thousand dollars. These men have been appointed by Mr. Eastman as trustees. Their names follow with those of a dentist and attorney: William Bausch, Albert E. May, Gustave Erbe, George H. Clark, Joseph Michaels, Thomas W. Finucane, Thomas B. Dunn, George W. Todd, Harper Sibley, Albert B. Eastwood, Frank A. Stecher, Edmund Lyon, Andrew J. Townson, Dr. Rudolph H. Hofheinz (elected by the Rochester Dental Society), James S. Havens, Attorney.

## Urgent Appeal for a Special Dental Hospital Fund for the Relief of the Many Sufferers from Wounds of the Face and Jaws Sustained in this War.

By DR. R. ANEMA, D.D.S., Paris, France.

The terrible injuries to the face and jaws among the wounded in this war bring into evidence the usefulness of dental, orthodontic and oral surgeons. Medical hospitals, in the beginning somewhat reluctant to accept their services, became gradually more conscious of the aid that these members of the healing art can give. Of this they become conscious, perhaps too slowly, and if after twelve months of war, which throughout Europe has resulted in 6,490,000 wounded\*, the help these men can produce is not in accordance with the need, it is not the fault of the special surgeons just referred to who vigorously try to make a breach in ruling traditions. An example of a certain lack of interest in the work of these men, by the directors of general hospitals, can be found in the words of a leading medical colleague who declared that it had been decided from the beginning that no jaw cases should be treated in his hospital. This lack of interest—it is said without any antagonism—finds its origin, no doubt, in a too special interest that the general practitioner of the healing art takes in his own work, but it nevertheless exists and must be taken into consideration. It is a fact that can astonish only those who have forgotten the heroic but vain efforts of Harris at Baltimore—doctor of medicine as well as a practitioner of dental surgery—to obtain the co-operation of the general medical profession, viz: the medical faculty of his city of that day (1839) for dental educational purposes.

The initiative of the American Institute of Dental Teachers to create “a fund to be given to the European Red Cross Dental Hospitals for the relief of wounded soldiers needing the services of dental and oral surgeons” represents an admirable movement by some of the most learned as well as practical men in the United States. *However, so far, no special Dental Hospital exists in Europe*, and this is a gap which our group wants to fill. Clinics, for lesions of the jaws, as a part of and attached to general hospitals or to dental schools, do exist, but so far no special hospital for dental and oral surgery.

*According to moderate calculations, there are among French and Belgian soldiers alone, up to May 5th, fifty-five thousand, seven hundred*

\*Official statistics of the War Office up to May 5, 1915.



and seventy face and jaw cases (55,770).\* Trench warfare, exposing as it does the heads, is the cause of this considerable number. Add to this that the largest number of jaw cases treated in one of the clinics just referred to, up to May 24th, in Paris, was 193, and we have three clinics of equivalent importance here, besides a few minor ones, as well as in the provinces, then one can form for one's self an opinion of the pressing need for special hospitals for dental and oral surgery.

To join our group of specialists, we have asked a surgeon, known for his ability in restorative surgery (skin and bone grafting), to aid us, and have been fortunate in receiving his acceptance. This is Professor Morestin, member of the medical faculty of Paris, and surgeon of the Paris Hospitals. Something we are sure his modesty wants to hide, but which we are proud to bring forward, is that he has recently been decorated for his services rendered in jaw cases. He is at the head of a special ward in the military hospital of "Val de Grâce," also of one in "Rothschild's Hospital." Both these wards are full. In a week he estimates that a special hospital of 200 beds for jaw lesions would be filled. Therefore, he is of the opinion that a hospital of 500 beds would be desirable. It will be seen that the sum we ask for at the end of this article is not exaggerated. Since the beginning of the war the greater part of Professor Morestin's time has been devoted to "cleaning operations." He cleans the faces and jaws of the wounded in his ward of bullets, shrapnel, pieces of shell, etc., to reduce fever and so prevent death from septicemia. *The restorative surgical, as well as the mecano-therapeutic facio-jaw work of numerous cases has yet to be done, now as well as after the war.* Knowing how much better results are obtained from quick treatment of jaw lesions than after a postponed treatment when wrong unions have taken place, the urgency of the realization of our efforts seems sufficiently obvious. This surgeon verbally says: *"The creation of a hospital for lesions of the jaws which are so frequent in this war seems likely to render great service."* Cognizant of this truth we have taken the initiative to endeavor to establish such an institution. Our efforts have so far met with considerable encouragement. To ascertain the official attitude, our organizing committee asked an audience with the French Ministry of War, and was very favorably received.

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\*Number of wounded French and Belgian soldiers 715,000 (War Office May 5, 1915.); 13% of which, according to a report in the Paris Academy of Medicine, are head wounds, that is 92,950. 60% of this number, according to moderate calculations, are face and jaw wounds, that is 55,770. To this should be added the number of Germans wounded in the facial region, prisoners in France and English wounded of the same category as far as they are not sent to England.



TO TOUCH THE HEART OF SOME GENEROUS DONOR.

Remarkable instance of the compensative force of nature: this man writes on a slate, not being able, of course, to talk, that he thinks himself fortunate not to have lost his eyesight. No heart so hard but that it must be touched by the sufferings these men have had to go through. It is up to you brethren across the ocean to help us and touch the hearts of those able to help. Europe will be grateful to you.



The use of a building was voluntarily offered. Also we were assured that we could have all the help required for laboratory work. This work will be done by workmen, at present soldiers, who will be ordered back from the front for our purpose.

The committee was requested to organize the hospital at once to receive the wounded. We shall be attached either directly to the French Army Red Cross Society or to one of the private Red Cross Societies. Other high officials have given moral support. We were received in special audience by the American Ambassador at Paris, who in a letter of sympathy speaks very favorably of the idea. However, in addition to this moral support, encouraging as it is, financial aid is necessary. Professional men are not rich, and in giving their daily services without remuneration they are giving about all they are able to; yet to lead the way financially we personally began to form a little fund, trusting in the ultimate co-operation of our brethren across the ocean. Together with an organizing committee of professional men, a financial committee, consisting exclusively of business men, has been formed, to be in accord with the French law on philanthropic institutions. *About twenty thousand dollars (\$20,000) is necessary to start a hospital of one hundred beds and run it for six months.* It does not seem a large amount when compared with the prestige that the profession at large, and especially the American profession, will derive from it. It is also our intention to invite colleagues, representative of the different specialties of the healing art above mentioned across the ocean, to come and help us.

Our urgent appeal now is this: *Could not every dental and oral surgeon and orthodontist, or any other member of the healing art in the United States, ask one or two of his most devoted patients to give him some money for this hospital? Donations, large or small, will be gratefully received by any member of our group, or may be sent to Messrs. J. P. Morgan & Co., Bankers, Wall Street, New York; to Messrs. Morgan, Harjes & Co., Bankers, 31 Boulevard Haussmann, Paris, as well as direct to our treasurer, Mr. Ch. Van Enter, 21 rue du Dragon, Paris.* The donations will be acknowledged in this journal with the names of the practitioner and his patient, in addition to which a proper receipt, engraved by a French artist, will be sent to each donor.

N. B.—All donations should be designated "*For the American Dental Hospital of Paris for wounds of the face and jaws.*"

Members of our group: William J. Younger, M.D.; John H. Spaulding, D.D.S.; I. B. Davenport, M.D., M.D.S.; H. Morestin, M.D.; J. F. André Bonnet, Ch.D.; Frank W. Williams, D.D.S.; F. J. Wilson, D.D.S.; R. Anema, D.D.S., Secretary.



## The Problem of Root Canal Treatment.

By FREDERICK W. FRAHM, Ph.G.; D.D.S.

*Professor of Dental Anatomy, Operative and Prosthetic Technics, Colorado College of Dental Surgery, Denver Colo.*

"What shall we reply?" is the question raised by Dr. R. Ottolengui to "The greatest problem of the day in dentistry," this problem being, How shall we take care of our root canal cases to avoid both local and systemic trouble that frequently follow our efforts in cleansing and filling them?

This question, of course, is an old one, and has been settled in the minds of a good many men to their entire satisfaction. Be that as it may, I think that a large proportion of men really have never looked this problem squarely in the face. I wonder if fear in the heart of many a practitioner has kept him from taking radiographic observations, recording them, and giving the profession the benefit of his report! The usual course seems to be that of allowing the defects in the work to remain buried in the alveolar process as long as they will remain there with no apparent discomfort to the patient.

As has been observed in recent reports on certain systemic diseases, these seemingly comfortable roots of pulpless teeth are a menace to the patient's general health and well-being. We must remember, however, that it has not been established beyond a reasonable doubt that these remote conditions are the direct outcome of these local foci of infection. Many shadows lurk around this supposed positive diagnosis based upon the radiograph of the teeth and associate parts.

**Diagnosis with  
Radiographs  
Doubtful.**

The writer has used the Röentgen rays since 1904 for their diagnostic value, and does not feel prepared to positively state upon examining a radiograph that a given condition prevails, or that certain pathological lesions are present. There is too much of an element of doubt surrounding such a diagnosis, and I would not be willing even to extract only one tooth on the simple findings of a radiograph. So many times we make two or more exposures of the case, develop the films under the same conditions in the same developer, and fix them in the same fixing and clearing solution, and with quite different results for some reason or other. This may be due to faulty technic in the dark room; the film gelatine may not be uniform; and last, but not least, the tube does not always work the same. Many other

factors would have to be accounted for before we could say, "We have made a positive diagnosis, one on which we would be willing to prescribe that a certain one or number of teeth shall be consigned to the forceps."

For a physician to state after the study of a radiograph that certain teeth are the cause of the arthritis or rheumatism, as the case may be, is ill advised. In February, 1911, the writer was attacked by a siege of arthritis, the infection of which entered his body by way of the tonsils after a severe exposure to wet and cold. I have never suffered from an abscess before, nor since this attack. Should I have all of my teeth extracted to render myself immune to the second attack?

While practicing in Pella, Iowa, a young woman twenty-two years of age came to my office to see why her maxillary plate would no longer stay up. She had worn it with satisfaction for three years. Upon investigation it was found that both of the maxillary third molars were erupting. She told me that her teeth had never been good, and had been extracted by her physician as soon as they had ached. This kind of practice did not disturb her in the least, for her mother had worn plates at the age of twenty. I removed these two teeth, at the time rendering her absolutely toothless. This patient a year later suffered an attack of arthritis of a severe type involving her heart. She recovered in six weeks.

The point I want to make is this: I do not think the medical fraternity has any right to make the dentist its "scape-goat" because of an inability to recognize the etiology of certain diseases. The Röentgen ray is a very valuable diagnostic agent, but has its limitations, and should not by any means be considered final.

But we must admit that there is room for improvement in our root canal technic, that there are a large number of teeth with one or more poorly filled root canals, and some with no fillings at all. Such a condition should not exist, since with a proper technic many of these supposed unfillable canals can be filled.

At our last State meeting, while in conversation **Mummification.** with a prominent dentist from a neighboring city, we were discussing this problem. I was very much surprised when he told me that he had not filled a canal for the last seven or eight years, and never even made an attempt to cleanse them, and is so well pleased with the results that he has abandoned this trying and difficult problem; mummification of the pulp being his technic, for he is an ardent follower of Dr. Söderberg and his methods. We cannot find language strong enough to denounce such a procedure, having been permitted on several occasions to see the evils that follow in the wake of this method. By all means remove every vestige of pulp tissue and replace it with a good canal filling.



### Instrumentation in Root Canals.

The question arises, "How shall these canals be opened to make possible a perfect canal filling?" Dr. Otto E. Inglis, in his chapter on root canals in the *American Text Book on Operative Dentistry*, gives a detailed discussion on the use of various canal reamers and drills in the opening of difficult canals, devoting part of the chapter to the patching up of perforations caused by the use of these instruments. He just mentions the fact that we may use chemical means for these cases, but gives no technic.

Dr. C. N. Johnson, in his work on *Operative Dentistry*, says very little on this most difficult and important operation.

Dr. G. V. Black, in his *Operative Dentistry*, takes up only those cases that do not require any special attention, and says nothing about the small curved canals. So we do not get any technic from him to offer the student in those cases that demand a little more than ordinary skill.

Drs. Max and Leo Greenbaum, of Philadelphia, and Dr. Bennet, of London, Eng., discuss Dr. Calahan's method of using reamers and 40 per cent. sulphuric acid in those difficult cases.

I might go on and quote many other authors which would only multiply the foregoing statement as set forth in the books cited. By far the larger per cent. of practitioners of this day advocate and use reamers and drills for opening the canals that submit with more or less ease, going as far as they can with such instruments.

Could it be possible that this procedure is to blame for so much of the septic conditions present around the apical portion of so many dead teeth? Since this sort of technic seems to be the only one that is set forth in the leading text-books used by colleges, and relied upon as authority for the student to follow, what can we expect from the profession at large when the new recruits get that kind of teaching? I am aware of the fact that there are teachers here and there who will supplement these teachings by their personal views and experiences. Still we have to let the student build on the text, even though we know that this technic will bring only from 20 to 40 per cent. results, and that only under the most favorable conditions.

The writer thinks and is convinced that drills and reamers such as are on the market to-day should be given very small consideration in the opening of root canals. That chemical methods, 50 to 75 per cent. sulphuric acid and the alloy of sodium-potassium, should be largely relied upon; in fact, I would go so far as to say that all canals requiring enlargement should be treated with the acid or the alloy. This may take a few more sittings and a little more of our time; nevertheless, it will be

time well spent, and we will have the satisfaction of knowing we have done our best, which in 90 per cent. of the cases will mean success.

I have found that the canal reamers such as are used to-day will, when introduced into a canal that is more or less curved during rotation, cut in two places: namely, at the side where lateral strain comes on the reamer due to the curve in the canal and at the point of the reamer, this

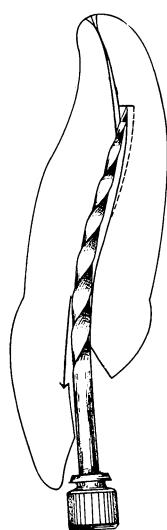


Fig. 1.



Fig. 2.

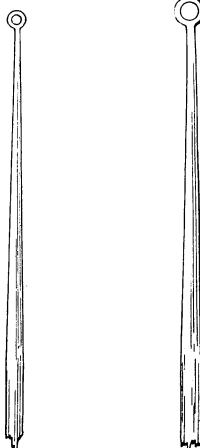


Fig. 3.

being due to the spring tension of the instrument (Fig. 1) The lateral cutting, of course, is not objectionable, being really desirable, but the point of the instrument is cutting out a ledge or shelf on the tension side which will prevent us from entering the canal beyond this point, leaving what pulp tissue or septic matter may be beyond this point. This canal when filled will become a menace to the patient and may be a source of systemic trouble.

**Broken  
Instruments  
in Canals.**

I was told while in college that canal drills made fine root canal fillings, though somewhat expensive. I can remember the day when I broke one of them in a mesia. canal of first mandibular molar of a young lady, and the weeks that I spent in caring for

this tooth, trying to rust it out with iodine. I can also remember that during the same year I perforated a lateral root by the same technic. This last patient had to have the tooth extracted. I dare say, if we made our confessions of the roots thus injured, and these facts were recorded, the figures would be appalling and might act as a stimulus to bring about a better technic in the care of root canals.

**Sulphuric Acid Treatment.**

I owe a great deal to Dr. Frank B. James, of Iowa, in whose office I spent the first year after receiving my degree. Through him I learned the technic of the use of sulphuric acid in canal work and the abandoning of the use of arsenical preparations for devitalizing. I adopted this technic and have faithfully followed it in all cases with very gratifying results. Not all, but a large number of these cases were checked up with the Röentgen ray, this being done as follows: When the canals are cleansed, or we thought they were, the fine end of a smooth broach or a tapered copper wire was then introduced to the apex, allowing these to extend into or beyond the cavity to enable us to remove them. With these in position, while the radiograph is being made, there will be no question as to how far your work has been carried, or the kind of canals we will have to fill. If this radiograph showed satisfactory results, the canals were dried and properly filled.

**Technic for Filling Canals.**

With the rubber dam in position without a leak of any kind, the pulp chamber is opened and the one large canal is cleansed with barbed instruments of proper size. This is usually very easily done in the case of the palatal canal of the maxillary molars and the distal canal of the mandibular molars. If it is found after investigation that the buccal canals of the maxillary and the mesial canals of the mandibular teeth cannot be taken care of with the barbed instrument, they must be enlarged. If the two foregoing canals are large, they should be filled and the opening of them in the floor of the pulp chamber sealed with wax, so that the acid will not penetrate where we do not need it. Then locate the openings to the other canals and enlarge them slightly so as to make them funnel-shape; then introduce a smooth tapering broach made from iridio-platinum (Fig. 2) as far as it will go, and leave it there as a guide for the acid.

I prefer these to the steel variety, for they are not affected by the acids and are much tougher. I would not advise the use of barbed instruments in this technic, there being too much danger of their breaking. Then with one of the loop instruments (Fig. 3) pick up the desired drop of acid (50 to 75 per cent.), carrying it to the place where the smooth broach enters the floor of the chamber; then by a pumping motion of



the smooth broach we work the acid up as far as we can, supplying more acid from time to time until we gain the desired goal, the apex. Unless there is a turn in the canal almost at a right angle we will experience very little trouble, and we can keep this up till we get the canal as large as we need. Sometimes this may require a number of sittings. When you are following the case up it will not be necessary to neutralize the acid at each sitting.

When the desired size of canal has been reached, the acid should be neutralized with a saturated solution of sodium bicarbonate. The liberation of carbonic acid gas that is formed by the chemical action will carry away with it all the detritis present in the canal.

The carbonizing effect of the acid on the canal contents, their walls and for a small depth into the tubuli of the dentine is very desirable, rendering the field practically immune to bacterial action, and will be a long step toward the abolition of small blind abscesses.

Is it worth while? This question has been asked many times after taking into account the time required to do this work. I will ask a question after taking into account the patient's ability to pay, and looking well after the professional, legal and mercenary side: "Can we afford to do any less?"





## American Society of Orthodontists.

### Discussion on the Paper of Dr. Grieves.\*

**Dr. Herbert H. Pullen, Buffalo.** I consider it a great privilege to open the discussion on such a comprehensive scientific paper as has been offered by the essayist, even though I am unable to present a scientific discussion of the subject matter. At least, I can express my appreciation of the value and importance of this paper to our society, and our deep obligation to the author for its elaborate composition and presentation.

I had long contended that the success of our treatment in orthodontia is based primarily on our understanding of the etiological factors involved in arrested or perverted development in the dental arches. The successful use of vaccines in medicine owes its inception to what was called the germ theory, and by the isolation of the particular bacterium causing such a disease as diphtheria; the later discovery and production of a preventive antitoxin refers directly back to the etiological factors involved.

In our reiteration and investigation of etiological factors in malocclusion we have stumbled upon the idea that these conditions were but local symptoms of deeper seated pathological disturbances none too soon, not to be taken too much by surprise by these newer etiological factors included in the essay.

Malocclusion itself we really recognize as a symptom of a deeper pathological disturbance than lack of occlusal function.

\*Dr. Grieves' paper appeared in September number.—Ed.

Normal occlusion is an impossibility unless the internal secretory organs are synchronizing all of the time during growth of the internal and external face, if we accept the theory of the extent of their influence. Normal occlusion is located on a mechanical function controlled absolutely by the growth-controlling forces of these ductless glands, and is a terminal function largely, although correlated through use and misuse, with growth or lack of it in the internal face.

I am exceedingly glad to have a theory on etiology presented which will conform to or link harmoniously with the orthodontist's idea of arrested or deficient development associated with or preceding occlusion of the teeth.

If we can accept the essayist's conclusions that the lack of breast feeding of infants and the lack of human activation in cows' milk predisposes to arrest of development of the dental arches and to consequent malocclusion, then we may sometime be forced to begin early treatment of malocclusion at the time of childbirth, so to speak, by supplying the activators or other nutritive elements necessary for normal growth of the infant. Perhaps the future orthodontist will succeed to the physician's mantle, carry activator tablets, calcic salts, and developmental powders; and make house to house calls, dispensing normal occlusion in triturated tablets.

I think this splendid paper furnishes the most conclusive evidence of the deeply rooted relation that orthodontia bears to general medicine and of the necessity for the teachings of more than the fundamentals in medicine to the future student of orthodontia.

How many of us ever dreamed that the physiological chemistry of college days which we passed by as a non-essential in the study of dentistry would one day hold first place in the laboratory research work in the search for causes of malocclusion. Did we ever dream that the once unknown internal secretory organs which we at one time thought too insignificant to study would one day array themselves in sequence and synchronism as organs absolutely necessary to life and controlling bodily growth, nutrition and metabolism?

If the comprehensive fabric of etiological material which the essayist has presented can be made to hold together as a plausible theory, even with only an occasional demonstrable fact, our own efforts at etiological investigation will appear but dim scratches on the surface of a vast fund of knowledge which appears to be unfolding before us.

Let us at once be imbued with the idea that the cycle of synchronism of the internal secretory organs is seriously impaired by the infectious diseases of childhood, such as scarlet fever, measles, chicken-pox, whoop-



ing cough, etc., and we will make greater efforts at isolation and prevention of these diseases. If by these studies of the internal secretory organs a correlation between the development of the dental and maxillary arches and the stimulation of the pituitary body to normal functioning is proven to exist, our own rather crudely expressed and unsupported theories regarding the influence of orthodontic treatment upon these growth-controlling organs will have been established on a more elaborate foundation of fact.

As Cushing says, "There are few subjects in medicine which promise a wider overlap upon the fields of many special workers than this one of hypophyseal or pituitary disease. From the direct implication of the optic nerves by the glandular enlargement, the ophthalmologist has often been the first to recognize these maladies. The neurologist's interest was early aroused through the pressure disturbances on the part of the encephalon, and will be reawakened in view of the possible relations of epilepsy to glandular insufficiency.

"Specialists, whose activities are as divergent as are those of the actinographer and the physiological chemist, are now called upon, not only to aid in the matter of diagnosis, but it lies in their province to add materially to our further knowledge of the subject. And, needless to say, to the operating specialist in nose and throat maladies the subject is of prime importance, not only because the hypophysis itself abuts on his preserves, but for the special reason that there exists a pharyngeal organ which may possibly be a not infrequent seat of disease and which may possess some physiological properties of importance to the organism."

The essayist has struck the keynote in the relation of these various internal secretions to developmental conditions when he says: "The significance of all of the foregoing (referring to all of the ductless glands, their secretions and pathological effects in disease) to the dentist is that he should differentiate acromegaly, from mandibular protrusion from other causes, and be able to recognize the tipping forward of the anterior teeth and increase in the dental spaces, and the orthodontist should bear in mind, no matter what his theory, from the numerous cases showing improvement in the pituitary syndrome, that it may yet be possible to relieve some of the symptoms by spreading the arches, possibly by drainage of the ethmoidal and sphenoidal sinuses, relief of lymph blocking or of the circulation, etc. In other words, the dentist and the orthodontist must enlarge the scope of their vision as to etiological factors and their internal and external pathological expression. Otherwise we are treating symptoms alone without the knowledge of the causative factors, which point the way even indirectly to the more scientific treatment of malocclusion.

**Bottle Feeding;  
Organotherapy.**

We must recognize our limitations in diagnosis and treatment and call in the trained specialist in other lines to assist us in diagnosis from a consideration of all of the etiological factors involved. If organotherapy will some time be depended on to stimulate normal function of the internal secretory organs and secondarily function and growth of the dental arches and internal sinuses; if bottle feeding is so serious a matter in its lack of supply of activators to development of the ductless glands, then it is up to the orthodontist to fall in line with the theory and at least understand the therapy of supplying artificial activators, so as to be able to give intelligent advice to parents.

As to organotherapy, in all probability after it has been experimented with until its possibilities are better known, it will be of assistance in constitutional treatment during the treatment of malocclusion.

The extent of the various phases of internal secretion, and the voluminosity of the subject matter of the paper in all its relation to orthodontia are so great that again I must regret that it has been impossible for me to have read one-tenth of the authorities mentioned in the text since receiving the paper, and even if I had I would still be unable to discuss scientifically this contribution as I should like to do.

I shall be interested in a further study of the paper, as I feel that it is one of the most valuable ever presented to this society.

I think most of us who have listened to this paper by Dr. Grieves are reminded how he covered the subject of the therapeutic action of metals some years ago when he won honorary membership in this society. You will remember how well he investigated that subject and how his results have practically never been questioned since.

He has clearly and exhaustively presented a tentative hypothesis for the explanation of some of the etiological problems we have encountered in malocclusion. I am sure that a common orthodontist like myself could not be expected to go into the details of this hypothesis in a critical way. The value that we shall realize in the presentation of this paper is to see how nearly his hypothesis squares to the facts of treatment retention as we see them in every-day practice. While some years ago we considered adenoids and diseased tonsils as causes of malocclusion, I think practically all men of experience have come to regard them as simply associated conditions. If we go on further we unconsciously realize that there is some condition back of the adenoids, and that Dr. Grieves has probably presented in his paper the true nature of those conditions.

Again, his hypothesis agrees with our prognosis. It explains why in so many cases we do not get complete success. There is that lack of tone in the bone which interferes with the final establishment of proper function. To verify this hypothesis we naturally and properly go back to the conditions existing among primitive people, and he suggested to me when he asked me to discuss his paper that I consider that phase of the subject.

**Deduction from  
Examination  
of Sculls.**

In the National Museum at Washington there are something like 300 skulls of children under twelve. It is quite a remarkable collection, probably the best in the world. While we find thousands of skulls in the museums, it is difficult to find those of children, and these have all been collected and kept together. They consist of the skulls of Indians, Mexicans and Esquimaux. In examining these skulls, I collected first those under five years of age. I found in the number I examined (about eighty) that there were seventeen under six years of age. If we consider the question as to how much these children were underdeveloped at that age, and the only standard of development we have is the Bonwill arch, corrected to correspond with the size of the teeth; if we take, not the extreme that we see in our human dentition, but the average, we find that the width across the second deciduous molars from what we call the occlusal line, that is, passing through the crest of the buccal cusps of the second molars, there is a variation of from forty-five to fifty millimeters. That is what would be the normal average. Of these seventeen, the average Indian child measured forty-five millimeters. You see there is something under normal there, but not greatly so; probably from two to three millimeters under what could be called normal. I went through the cases in my own cabinet and found models of eleven cases of children under five. These average thirty-eight millimeters. While the Indian child is slightly under normal at this age, our American child is greatly so, that is, from seen to eight millimeters under normal.

I found there fifty-one cases of children six years of age and eleven or twelve, and these were practically all normal; that is, the average width across the occlusal line in the region of the first permanent molar is from fifty-one to fifty-five millimeters, and the average in these fifty-one cases of Indian children was fifty-two and one-half. We can say they were practically all normal. With the variation that you would expect from the size of the teeth and the type of the individual, possibly they were exactly normal.

Taking thirty cases from my own collection of white children I found an average of forty-seven millimeters, about five and a half milli-

meters less than in the average Indian child. To corroborate Dr. Hrdlicka's observations and those of the essayist, all of our white children are under normal. The statement has been made constantly that our white children present the picture of arrested growth. There is not what we would expect, namely, a natural growth from a child of four or five to nine or ten. In the Indian children there seems to be a greater growth up to the age of four or five than in the white children, and from that time on, after the eruption of the first molars, while the white child stands still, the Indian child grows and becomes normal. He grows up to what we call a normal arch. There is no evidence whatever in these skulls of malocclusion, or of adenoids or protruded teeth. There are none of these types. They are somewhat difficult to judge, because in almost every case the incisal teeth are lost on account of the conical roots.

**A Member.** I would like to ask Dr. Hawley whether he has made any investigation of negroes. In my State there are more of them than there are in New York and other places. I would like to ask him whether he has ever examined the skulls of negro children?

**Dr. Hawley.** Not accurately at all. I have observed a good many, but have not made critical examinations.

The modern negro, so far as casual observations go, is almost in the condition of the white child. I asked the Dean of the colored dental school in Washington as to his clinical work in orthodontia and the condition the colored children presented, and he said they are beginning to find as much malocclusion in the negro children as in the white; but where they go back to the primitive negro there is very little malocclusion.

**Dr. Ottolengui.** There is less malocclusion in the negro of the South than in the negro of the North?

**Dr. Hawley.** Very much so.

**Dr. Grieves.** Dr. Hrdlicka says the negro is almost generally rachitic, that is, he has rickets in some form. Of course, that would affect his occlusion.

**Dr. Hawley.** The negro in modern civilization presents a very different picture from the negro back two generations. He is afflicted with disease and decay of the teeth and malocclusion, yet there is evidence of normal primitive conditions.

In discussing this subject with Dr. Hrdlicka I find that he is very emphatic in his opinion as to the value of breast feeding in Indian children. Also, the Indian child is given as soon as he wants it any hard food. He is given green apples and other hard food. Anything the

child wants to chew he chews. It does not seem to hurt him. If we should give a white child green apples, or anything it wants to chew, we would expect it to die. The Indian child does not die from eating such food. If we would take the evidence presented it would almost corroborate Dr. Grieves' opinion that there is, in the first place, a greater activation of growth in the skull up to four or five years of age. Then we come to the function of the teeth, and the Indian child at an early age subjects the teeth to severe use. You find all the temporary molars with the cusps worn off, and some of them worn half way down to the sockets, showing the severe use to which they had been subjected. It seems to me, we are going to get a new hold on this proposition, and probably we may finally have some suggestions to make in regard to the diet of children that will be extremely valuable.

I do not presume to rise to discuss this very carefully prepared scientific paper, but I would like to ask for some information. The diagnosis of some of the cases cited by Dr. Grieves is more than I can understand, and in this connection I want to relate briefly a case.

A year or so ago there was brought into my office a patient presenting normal occlusion on the left side, but on the right side the teeth were fully one-half inch apart. From a superficial examination from the facial expression I came to the conclusion that the ramus on the right side was much longer than the ramus on the left side. I could find no evidence of early dislocation or of fracture. I advised that an X-ray be taken, and I have skiagraphs of the condition. I would like to ask Dr. Grieves his opinion as to whether he thinks the pituitary body frequently has an influence over these conditions in causing a slow development of bone tissue. There has been over-development of bone tissue in the ramus of the right side, and I understood him to say that on removal of the pituitary body there follows a diminution of bone tissue.

**Dr. Grieves.**

That is what somebody else said.

**Dr. Juvet.** The information I wanted to get is this: Have you ever had, Dr. Grieves, a case of a similar nature under observation, and have you had the opportunity of perceiving the effect of the removal of the pituitary body, and if so, to what extent did you get a diminution of bone tissue beyond the normal from the removal of the pituitary body?

That is just the reason for writing this paper.

**Dr. Grieves.**

I do not know, and we must all make observations.

The condition in your case was asymmetrical. Those I have seen have been symmetrical. I have seen but one case that has reduced. Operations on the pituitary body are comparatively rare. I

have seen one case that has been reduced somewhat, but I have not seen any returns such as described by the different authorities. In those I have seen the mandible was symmetrical. There was apparently growth of the alveolar bone with symmetrical growth of the malar region and mandible, not asymmetrical, as in your case.

Do I understand that we are to gather the idea

**Dr. Ottolengui.** from what you have said that this overgrowth, although symmetrical, will be confined to the mandible?

If there is overgrowth traceable to some influence of the pituitary body, is it always confined to the mandible or may it involve the maxillary bone?

**Dr. Grieves.** I mentioned the mandible and the malar region.

**Dr. Ottolengui.** Would it also involve the maxillary bones in some cases?

**Dr. Grieves.** It might involve one bone and not the other. It is not explainable.

**Dr. Ottolengui.** If it is not explainable, it is not much of an hypothesis. What I mean is this: I have been looking at this subject from a logical standpoint, and I

find it difficult to understand why the influence of the pituitary body would cause overgrowth of the mandible and not affect the maxillary bones at the same time. In these acromegaly cases we see the influence extending elsewhere besides the mandible, as in the first picture thrown on the screen by Dr. Grieves, where there is undoubtedly an increase in growth in the forehead, and the hands also have increased in growth. It is hard to believe that this pituitary influence can be confined to such an isolated locality as the mandible alone.

**Dr. F. C. Kemple,  
New York City.** When Dr. Grieves writes a paper it is usually one of importance and interest to the profession, and the present essay is no exception in this respect. The

subject of "Internal Secretions" is one of profound importance and interest to both the medical and dental professions, and in handling this subject the essayist is dealing with one which offers a broad and almost virgin field for research, the surface of which has not even been delicately scratched.

A short time ago a paper was read at Albany before the New York State Dental Society on the subject of internal secretions. One of the members of the Program Committee, in casting about to find some person who could intelligently discuss such a paper, called up on the telephone a prominent physician in New York City and asked him if he could suggest some one. The physician thought for a moment, and then, calling this member of the committee by name, said, "Well, Bill, none of

them really know a blank thing about this subject, so it doesn't make much difference who you get to discuss it." (Laughter.)

As I listened to the essayist it struck me that one of the chief thoughts running through his paper is that the internal secretions exercise a very important influence over the development, not only of the maxilla and mandible, but of all parts of the body, affecting particularly the osseous structures. Also the essayist has cautioned against accepting any positive statement concerning just how these secretions influence the process of growth, or just why they do it. About all that we know at the present time concerning them is, that they are not the use'less, functionless organs that they were at one time supposed to be; that they play an important part in balancing the metabolism of the organism, and now it is up to the physiologist to find out how they play this part, and in what manner their action can be controlled.

This subject offers a valuable and fertile field for research, and I believe the essayist intends this paper to be more as an introduction to a study of the subject than an attempt to deal with it exhaustively.

**Dr. Grileves.**

A protocol only.

**Dr. Remple.** Yes, a preliminary to the study of the possible relation that internal secretions may have to malocclusion.

He is not making any positive statements; he has simply collected and presented his data to this society as a contribution to the study of the subject, and to stimulate an interest and further study by members of this society. But it would be well to emphasize the caution which he has expressed, *i. e.*, not to accept these statements as either positive or final. It is all too soon for anyone to say that this condition or that condition is caused by pressure on the anterior left lobe of the pituitary body, or by a pathological state of the hypophysis, or of some other part of this poor little body. One may think it, but does he know it?

In regard to the Indian children: A few years ago, while up in Canada, I had an opportunity, through the courtesy of one of their Indian agents, to examine the mouths of a large number of Indian school children between the ages of six and fourteen years. It happened to be holiday time, but this gentleman called a meeting of these children at the school house and we had a regular examination. I spent several hours in studying their mouths, and in making the examination I measured the arches according to the Hawley charts. I found them all, without any exception, to be well developed arches, practically normal in width. Also, there was practically normal occlusion in all of them except where approximal contact had been destroyed by caries, or teeth had been prematurely lost and adjoining teeth had drifted into the space.

**Dr. Grieves  
(Closing).**

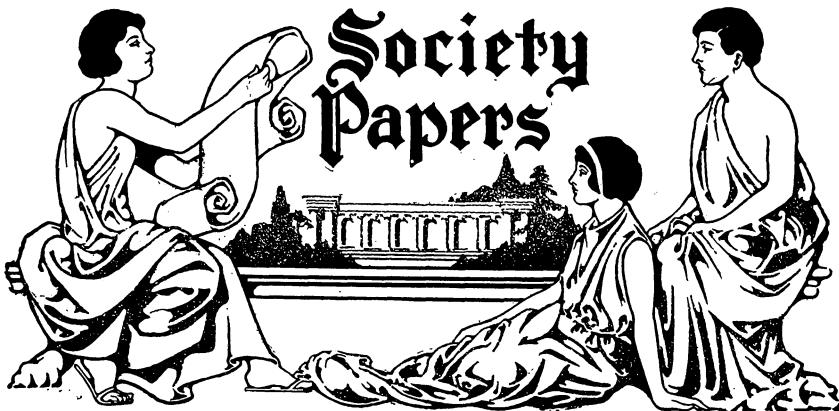
Our internal secretions are very much disturbed. no doubt, by the first point Dr. Kemple made, although I will say the quotation was taken from Dr. Tandler. He made the remark that the effect on the jaw might be from syphilis in the mother affecting the child in utero; that is, the effect of the syphilitic mother on the bones of the child. He also mentioned rickets. Disagreeing with my friend, Dr. Kemple, I believe there are many assured facts in this work, and this work is going on rapidly. I think there are assured facts when Dr. Mayo will perform 1,500 thyroidectomies to relieve goiterous conditions. There are certain hypotheses which have been proven on which surgeons are working. There is no reason why we should not work on the same hypotheses as far as they have gone.

**Dr. Kemple.** My statement is that I do not believe there are any facts already obtained that have a direct bearing on malocclusion at the present time.

**Dr. Grieves.** My hope in bringing this paper before you was to assemble the facts known to-day in relation to the possibilities in orthodontia.

It would be nice if the members of this society could make such pilgrimages as are made by some societies in going from museum to museum and studying the conditions in these museums, such as the Society of Americanists, for instance. It would pay us to make a pilgrimage to these points and see the large numbers of specimens, just as it would pay us to visit the National Museum to look over the eleven thousand skulls there. I came here for information and to present data for your benefit in regard to orthodontia. We are going to try to do a little more, and I hope that you will take it seriously enough to go home and associate yourselves with pediatricians and internists and get them interested, and the best way to get them interested I have found is to be very conservative. I have a few children on lactate of calcium, barring the use of thyroids, since the first of the year, and have had interesting results. I am not thinking of the old scheme of feeding lime, but of the lactate of calcium as a possible activator of the glands with internal secretions. I wish you would notice children who have enamel hyperplasias, who lose their temporary teeth very early and then are slow in erupting the permanent teeth. I would suggest the use of lactate of calcium in such cases, and it can be given quite freely in these conditions.

I thank you very much for your attention.



## **Mouth Infections; their Cause, Treatment and Systemic Effect.**

By ARTHUR H. MERRITT, D.D.S., New York.

*Prepared by invitation, and read before the Massachusetts State Dental Society  
at its annual meeting, May 5-7, 1915.*

Infection may be defined as "the succession of changes induced in the organism generally by the growth within it of microbes." (1) All infecting organisms are living proteins capable of growth and multiplication. (3) Though simple morphologically, they are chemically quite as complex as are many of the cells of the higher plants and animals. Like all living things, they must feed, assimilate and excrete. This they do through the activity of their ferments, which are of two kinds—extra-cellular and intra-cellular. These ferments are specific in two senses: first, each cell elaborates its own ferment; secondly, this ferment is able to split up only certain proteins. They are further influenced by the relation between ferment and substrate, and by the accumulation of fermentative products. The pathogenicity of an organism depends upon its ability to grow and multiply within the animal body. (3) Its inability to do this may be due to the fact that it cannot appropriate to its own use the proteins of its host, or it may be destroyed by the ferments which it provokes within the body. Infection depends largely upon the number and virulence of the organisms involved, and to the resistance which the body cells offer to their growth and development. The effectiveness of these defensive ferments are influenced by age, heredity, environment, health, etc. Infections may be acute or chronic, systemic or local. When the infecting organisms multiply rapidly, leading to a general sensitization of the body cells, the disease is acute. When, on the contrary, conditions are less favorable to their growth, and sensitization is not general,

the disease assumes a chronic form. When widely distributed throughout the body with general sensitization, the disease is systemic, while on the other hand, with restriction of organisms and sensitization, the disease may be regarded as local. (8) In one sense, there is no such thing as local infection. An infective process cannot be segregated or its boundaries defined. Even Nature cannot do this, though the attempt is made, and under favorable conditions a measure of success is achieved. An infection so slight as to pass unnoticed may be the exciting cause of an arthritis deformans which will cripple for life, or it may produce an irreparable heart lesion. Again, such conditions may exist for years and leave no effect which we, in our clumsy way, can appraise. They must, however, register themselves somewhere in the body; their effect may or may not be permanent, but it is probable that in every instance a tax is imposed.

Infections which take place in the oral cavity are no exception to these laws. Their effects cannot be limited to the mouth, nor can their influence upon the general health be measured. It is impossible, with our present knowledge, to estimate the possible consequences of any infection, no matter how insignificant it may appear. There is only one safe rule to follow in every case, and that is wherever possible to eliminate them altogether, and this whether there is or is not evidence of systemic poisoning. To do less than this is reprehensible.

**Importance  
of Mouth  
Cleanliness.**

Because of the intimate relation which the mouth sustains to the organs of digestion, its hygiene is of prime importance. Infections causing the greatest number of diseases find their way into the system, via the alimentary and respiratory tracts. (2)

An unclean mouth, in which there are no lesions of the soft tissues and no localized infection, must be regarded as potentially if not actually dangerous, since it is undoubtedly the root of most dental diseases and their sequelæ. Less than 20 per cent. of the people have healthy mouths. The infected mouth shows a tendency to the acid reaction, and it is through this acid change that we have an additional danger in cell degeneration, of malignant type, from chronic irritation. (2) How common such conditions are, only the dentist knows. Very few people keep their mouths as clean as they should do, or as clean as they think they do. The result is that it harbors vast numbers of germs which may find their way into the crypts of the tonsils, the gastro-intestinal tract, the accessory sinuses, finally breaking down the soft tissues of the mouth, and establishing there chronic foci of infection.

The danger lies in the constancy of the bacterial supply and the

strain which it imposes upon the defensive forces of the body. A clean and healthy mouth should be the end of every dental operation. No patient should ever be dismissed until his mouth is clean and he has been most carefully instructed in how to care for it himself. This is said realizing that it is not always possible to do this, through inability to control all patients, and realizing also that it is the most neglected feature of general dental practice.

**Dental Hygienist.** The "dental hygienist" who thoroughly cleanses the mouths of her patrons is rendering a far more valuable service than is the dentist who, neglecting this, makes the most perfect restorations of gold

and porcelain. This is the first lesson in the dentistry of the twentieth century. In an address before the National Dental Association last year, J. C. Bloodgood, M.D., said (16): "The great majority of dentists prefer to do the most expert mechanical work—bridgework and other things that require great skill. They do not like to clean teeth. The day is coming when more lives will be saved by keeping the people's mouths clean than by doing bridgework. The preventive measures of dentistry are tremendous. None of us realize what they are. We do not know whether leukæmia, pernicious anæmia, Banti's disease, Hodgkin's disease, and many others (all incurable), do not get in through the teeth. Perhaps many abdominal lesions, such as gastric ulcer and appendicitis, are traceable to infections which get in through the teeth as well as through the tonsil. So this thing you like not to do, cleansing the teeth, may be the most important and expert thing you can do. I believe it is an expert thing."

**Partially Erupted Third Molars.**

A not uncommon chronic infection to be found in the mouth is that caused by partially erupted third molars, especially those of the lower jaw. It is surprising how often these are overlooked, and how often they may be the obscure cause of grave systemic symptoms. The crowns of these teeth are often malposed with only one or two cusps visible above the gum line, inviting infection which at times may be acute, but more often is chronic and wholly unsuspected. Pressure of the finger along the buccal and lingual surface of these teeth not infrequently reveals an astonishing amount of pus, which drains into the mouth and nasopharynx, with probably more or less direct absorption. No examination of the mouth is complete which does not include a careful scrutiny of all such teeth. When malposed, or when insufficient room makes improbable their taking their proper place in the arch, they should be promptly extracted.

**Crown and  
Bridgework.**

Another prolific source of mouth infection, and one for which the dental profession must be held responsible, is the vast amount of ill-fitting and unsanitary crown and bridgework (usually non-removable) that is being made use of, complicating and often making impossible the proper cleansing of the mouth. Most of this class of dental operations is wholly unnecessary, since there is usually a solution of the problem in some other way. They have their origin in a desire on the part of the patient to fill in the space made by the loss of teeth with an appliance that is stationary, and with no appreciation of its possible danger. Every crown that causes a chronic inflammation of the gum margins, every mechanical restoration that cannot be kept clean, is just as surely a source of infection as is the chronic abscess or pyorrhea. The time has forever gone by, in fact, there never was a time when mechanics as applied to dentistry had any right to the center of the stage, had any right to be considered as it has been, the alpha and omega of dental practice.

**Dento-Alveolar Abscesses.**

One of the most common infections occurring in the mouth, because found at all ages, is the chronic alveolar-dental abscess. These abscesses are caused primarily by non-vital teeth, and may be divided into two classes—the fistulous and the blind abscess. They may also be divided according to the source of their infection—whether it be via the mouth or blood stream. The complete bacteriology of these infections is still uncertain. (5)

The prevailing organism appears to belong to the streptococcus group. (15) It is important that more study be given to these infections, especially with a view of ascertaining the relationship which they may sustain as causative factors in hematogenous infections. In those cases which present without previous treatment the removal of the gangrenous tooth pulp, disinfection of the pulp canals and proper filling of same will usually effect a cure. In those which do not yield, and in that large class of cases resulting from faulty root treatment, radiographs are essential to correct diagnosis and treatment. When there is an appreciable area of necrosis, involving the body of the bone and root end, a root resection is in most instances necessary. This is especially true of blind abscesses, since it is the most prompt and effective way of eliminating them altogether. Where the radiograph shows only slight decalcification, and the root can be filled to the end, nature will usually effect a cure. But in all cases where a root cannot be filled to the end, and where infection has already taken place in the peri-apical tissues, however slight it may be, the unfilled portion of the root should be amputated. This is a simple operation, and yet one in which a careful technique should be observed.



The first requisite is a good local anesthetic, novocain being most satisfactory. Since it is important to have a bloodless field in which to operate, adrenelin chloride, or some of its synthetic substitutes, is desirable. Having the field of operation thoroughly anesthetized, a V-shaped cut is made in the gum with the apex toward the tooth. This should be dissected back, exposing that portion of the bone directly over the necrotic area. If the abscess has a sinus, this will be visible. With a small round bur this should be enlarged, or if there be bone, as in blind abscess, a hole should be drilled through into the cavity within the bone. This cavity will usually be found filled with a fibrous granulation tissue, all of which should be removed, and the cavity extended until healthy bone is reached. The root, which should be previously filled when possible, should then be amputated flush with the floor of the cavity. When the root does not extend far into the cavity, the most satisfactory way of doing this is with round bone burs of various sizes. With the use of a proper amount of adrenelin, the operation will be practically bloodless, permitting a clear vision of each step taken. When all is done, the cavity in the bone should be irrigated and packed with sterile gauze, after which the gum flap should be brought back into place. There is no need of suturing this, as the parts will be kept in apposition by the lips and cheek. Since it is necessary to change these dressings every two or three days, until the cavity has filled in, a small opening at the apex of the flap must not be allowed to heal. This will close promptly with the removal of the last dressing.

When properly done there is practically no after-pain, though there is apt to be some swelling of the face for a few days.

The tooth so treated becomes as firm in its socket and as useful as before treatment. Clinically, the results are all that could be desired. In many of these cases, especially those in the upper jaw, radiographs show that these cavities ultimately fill in with an osseous deposit which, radiographically, is not unlike normal bone. In some cases it is probable that this does not occur, the cavity filling in with granulation like tissue. Clinically, it seems to make little difference. There are, of course, certain cases which are inoperable, where the root has been so far involved in the necrosis as to be permanently weakened. Such teeth should be extracted.

#### **Pyorrhea Alveolaris.**

Pyorrhea alveolaris has long been a subject of inconclusive debate. Even at present the most speculative and unsubstantiated views are entertained. There is no agreement as to its etiology, pathology or treatment. It is a disease which assumes a multiplicity of types, with an

endless variety of gradations, and no generally accepted classification. So chronic is it that it may exist in the mouth throughout the whole of adult life. As a potential trouble maker, it is the king of mouth infections. The best authorities on the subject are of the opinion that while it may be, and doubtless is in certain cases, a purely local disease in its inception, it may, and not infrequently does, have a systemic predisposition which may be inherited or acquired. What this predisposition is, is uncertain, but there can be little doubt of its existence. In many instances it is doubtless of metabolic origin. (22) Whether this predisposition is sufficiently potent to cause the disease, if careful attention is given to local preventive measures, is uncertain. The disease begins at the gingival margin of the gums, the exciting cause being some irritation, which causes a\*solution of continuity, followed by infection and inflammation of the gums, necrosis of the alveolar bone and pericemental membrane, which, if not arrested, continues until the supporting tissues of the teeth are destroyed. With their loss the disease heals spontaneously.\* If the irritation which produced the initial inflammation and subsequent infection were prevented, would the disease develop and run its chronic course? In a word, if the mouth were kept clean and the gum margins free from irritants, how many cases of pyorrhea would there be, even in those cases in which there may exist a predisposition? It is probable that there would be very few, though the care necessary to achieve this result would naturally be greater in some cases than in others.

**Endamoeba  
in Pyorrhea.**

In view of the widespread interest aroused by the announcement that the endamoeba buccalis is the direct cause of pyorrhea (18) (19), and that as a result of its destruction by emetin there is marked improvement in the disease (in not a few instances practically curing it), it is necessary to inquire into the claims made by the advocates of this treatment. In the *Proceedings of the New York Pathological Society*, 1907, Dr. L. T. LeWald presented a preliminary report of investigations which he had been carrying on as to the occurrence of amoeba in the mouth of healthy individuals. In this report he says he was able to convince himself that these amoebae would be demonstrated in the mouth almost constantly, no matter how much care was taken of the teeth. In the first examination of one hundred cases he obtained positive results in seventy-one. In going over some of the negative cases he found amoeba in four more, and he felt that with repeated examinations they could be demonstrated in most if not all the others, and concludes his report with these words: "There was left in his mind no doubt as to their presence

\*The author is not unaware that this is denied by Goodby.

in the human mouth in health, equalling in this respect the presence, for instance, of the bacillus coli communis in the intestines."

In a paper entitled "*Amœba in the Mouths of School Children*," read before the New York Pathological Society in March, 1915, Dr. Williams, Assistant Director of the Research Laboratories of the New York Health Department, reported the result of an examination made by that laboratory. A preliminary examination was made of 475 school children, between the ages of 9 and 16. One hundred and fifty were chosen as representative cases, and subdivided as follows:

1st—Healthy gums, no caries.....	20
2nd—Healthy gums, carious teeth.....	22
3rd—Tartar and receding gums.....	47
4th—Spongy and bleeding gums.....	65

From most cases, two smears were made, the teeth and gums having been previously cleansed with a cotton swab dipped in 5% alcohol. These smears were then examined for amœba, with the following results:

Class 1—Healthy gums, no caries—positive.....	30%
Class 2—Healthy gums, carious teeth—positive..	50%
Class 3—Tartar and receding gums—positive...	84%
Class 4—Spongy and bleeding gums—positive..	94%

It will be observed that amœbæ were found in every class, and that in inverse ratio to the health and cleanliness of the mouth.

Commenting on this, the author says: "We can say nothing definite yet as to the significance of the amœbæ in these mouths. Finding them so often in apparently healthy mouths, and in such young children, does not agree with the statement of Bass and Johns and Barrett, that they are not found in healthy mouths."

From among my own patients I have to date (March 27th) selected 57 cases for examination as follows:

Pyorrhœa (representing many types and all stages, from the earliest manifestations to hopeless cases).....	47
Unclean mouths, but free from pyorrhœa.....	4
From around ill-fitting crowns.....	4
Clean mouths (meaning those of which one sees on a few in a year in perfect health).....	2

From one to five smears were taken in each case. These were fixed with methyl alcohol, and sent to the Research Laboratory for examination, with the following results:

Pyorrhœa, 47 cases. Positive, 46. Negative, 1.\*

Unclean mouths, 4 cases. Positive, 3. Negative, 1.

Clean mouths, 2 cases, both positive.

From around crowns. 4 cases, all positive.

\*A re-examination showed this to be positive.

From among the pyorrhea cases there were selected only five for emetin treatment. These showed an abundant discharge of pus, representing different types of the disease. In one case, 28 teeth were involved; in another only four, but all were cases in which the prognosis was favorable. In a word, there were no hopeless cases among them. None had less than six half-grain doses of emetin, subcutaneously injected (one-half grain daily), and two had more. At the conclusion of these injections, smears were again taken, never less than three, and from all parts of the mouth. Numbers 1-19 and 46 were still positive, numbers 5 and 60 were negative. Case No. 1, 28 teeth involved, was then treated with a one-half per cent. solution of emetin flowed into the pockets daily for seven days, one Sunday intervening. Several smears were then taken; all were positive. In none was there any improvement which could be observed after the most painstaking examination, except that in Case 19 there was less inflammation of the gum around one especially bad tooth, possibly due to the hemostatic action of the drug. This case had had six half-grain doses of emetin, and several times the pockets were flooded as directed, yet two of the three smears were still positive. In none of them had the pus decreased. Four of the patients reported that their gums felt better, and No. 1 complained of an unpleasant feeling, "as though the gums were rubbed with alum," as she expressed it. How much of this was psychological I do not know. One patient was nauseated and vomited after the first injection of one-half grain. It is realized that these cases are too few to have of themselves any evidential value. They form a part of an investigation begun long before the invitation to prepare this paper was received, and are reported here merely as corroborative of the findings of LeWald and Williams.

It is too early to form any final conclusions regarding the rôle the endamoeba may play in the etiology of pyorrhea, or of the therapeutic value of emetin in its treatment. However, in view of the evidence already at hand, it may not be out of place to inquire into the present status of this so-called "wonderful discovery."

In the light of this evidence there can be little doubt that the endamoeba is present in practically all mouths, contradicting the statement that they are found only in mouths in which there is pyorrhea. (19) It is also probable that emetin is an amoebacide, but an uncertain one at the dosage advocated. Another characteristic of emetin, and one of which no mention is made by those advocating its use in pyorrhea, is its hemostatic action. (21) An interesting question which naturally suggests itself in this connection is whether the improvement in the gums ascribed to its amoebicidal quality may not be due to the fact that it is a hemostatic. The fact that cases with inflamed gums show improvement

in this respect, and the statement of patients that their gums feel better, points to this as the explanation, as does the fact that those who were conscious of this improvement while under treatment, after it was discontinued, state that the feeling of improvement gradually disappeared, and that they lapsed back to the condition which prevailed prior to treatment. If this be true (and there is at present no proof that it is not), its effect can only be transitory. On the other hand, if this improvement be due to the amoebacidal action of the drug, it must also be more or less evanescent, since it is practically impossible to permanently eliminate the amoeba from the mouth. Whatever its action may be, there as at present no trustworthy evidence that it will cure pyorrhea. Until this can be done in a sufficient number of cases, and by a number of investigators working independently, there can be no justification whatever for the claim that the endamoeba is the specific cause of pyorrhea. (18)

#### **The Bacteriology of Pyorrhea.**

The most striking thing in connection with a study of the bacteriology of pyorrhea is its complexity. Not less impressive is the lack of agreement in the findings in different cases. That this may be the more clearly understood, I have selected from among others three cases of pyorrhea of which a bacteriological study was made by the Research Laboratories of the New York Health Department, and tabulated the results; also for comparative purpose, those obtained from study of the tonsillar flora in one case and of the salivary and tonsillar flora of a healthy mouth. All are based on reactions determined under identical conditions. Only cocci or coccus-like organisms, which represent a minor fraction only of the total bacteria present are included. An analysis of these cases show that all were represented in the four main groups—cocci (cocci-bacilli), cocci (lanceolate chains), diplococci (chains), cocci (not classified)—that they sub-divided into forty-two subgroups, in which they were in agreement in only eight instances, and disagreed in thirty-four, and that they were represented in these sub-groups by seventy-eight different cultures. In the case of the tonsillar flora taken from one of the pyorrhea mouths, it was represented in three of the main groups, and in eleven of the sub-groups by twenty-one different cultures. In only one sub-group did it agree with the pyorrheal flora.

The flora of the healthy mouth fell into two of the main groups only, and into six sub-groups, showing twenty different cultures. In no instance did it agree in the sub-groups with the flora in the pyorrheal cases, but did so in three of the six sub-groups with the tonsillar flora of the pyorrheal case. Despite this disagreement, however, it is probable that the organisms present in pyorrheal pockets are also found in healthy mouths, but in such relatively small numbers that a single examination

does not reveal them all. Finding a more favorable focus in the pyorrhreal pocket, they multiply more rapidly, thereby assuming a preponderance. The difference, therefore, is a quantitative rather than a qualitative one. Such quantitative variations are observed in the number of spirochaetes and fusiform bacilli in normal and abnormal mouths, the latter not necessarily pyorrhreal.

While these results cannot be taken as absolute, they afford some idea of the complexity of the mouth flora, rendered more complex by the presence of pyorrhrea. This is the more impressive when it is realized that the coccis groups represent only a small fraction of the organisms present, and that a careful study of the various other aerobic types and their differentiation, together with that of the anaerobic flora, would probably result in similar varied and complex findings.\*

#### Vaccines in Pyorrhrea.

The first requisite to success in the vaccine treatment of any disease is to establish the causal relationship of the organism to the disease under consideration. Since each organism provokes in the body its own specific ferment which has no influence whatever upon organisms of unlike nature, the importance of clearly establishing this relationship will be obvious. So sensitive is this balance between organism and ferment that the slightest variation of type may render the vaccine worthless. In nothing is absolute accuracy of more importance than in vaccine therapy. When it is realized that at present there is not the slightest proof that any of the organisms associated with pyorrhrea sustain any causal relationship to it, the irrationality of selecting one or two types out of the vast host of organisms present, and making these the basis of vaccine treatment, must be self evident. In the light of our present knowledge, vaccines of this character have no place whatever in the treatment of this disease.

#### Treatment of Pyorrhrea.

Pyorrhrea is a preventable disease, probably the most easily preventable of all those occurring in the mouth. It is also a curable disease, though every case will, if long enough neglected, reach an incurable stage. The prognosis, therefore, depends largely upon the stage to which the disease has progressed. Treatment consists in a careful curetttement of each pyorrhreal pocket, the removal of calcarious deposits and necrotic tissue, the correction of occlusion on weakened teeth, the stimu-

\*Grateful acknowledgment for assistance in the preparation of this portion of the paper is made to Dr. Wm. H. Park, Director of the Research Laboratories, N. Y. Health Department. Dr. Anna W. Williams, Asst. Director. Dr. Chas. Krumviede, Jr., Chief Bacteriologist, and to Dr. Wm. R. Williams, Visiting Physician to the N. Y. Hospital.

lation and massage of the gums, and the maintenance of a high standard of mouth hygiene.

Inquiry should always be made regarding the patient's general health and habits of life. In all cases where a constitutional relationship is suspected, a careful physical examination should be made and the co-operation of the family physician sought. With our present limited knowledge of these relationships, dependence, however, must be placed upon local treatment. When this is skillfully done the results are most gratifying. The discharge of pus ceases, the gums resume their normal color, the teeth tighten in their sockets, and the patient is able to use them more or less freely. When not too far advanced, the disease can be permanently cured by such treatment.

There are, of course, incurable cases, and what is more frequent, teeth that are incurable in mouths where many of the teeth are only slightly involved. It is not always easy to determine when a given tooth is incurable, and the attempt is often made to save such teeth with discouraging results to both dentist and patient. When in doubt, the tooth should be radiographed.

When the dental profession realizes that pyorrhea is a preventable disease, that in its early stages it is easily and permanently cured; that only those cases are hopeless that are long neglected; that no drug or vaccine ever will of itself cure the disease, and that dependence must be placed upon local treatment, they will have taken the first step toward the elimination from the mouth of their patients of the chief of mouth infection.

#### **Possible Systemic Effects of Mouth Infections.**

That infections located in the mouth may be the cause of systemic disturbances more or less grave there can be little doubt. What per cent of these have been definitely shown to be the direct cause of such disturbances, what is their relative potentiality for evil, and just how they are brought about, are details about which we know little, and which must be studied before we can hope intelligently to co-operate with the physician in the care of these cases. With our present limited knowledge concerning these secondary infections, a word of caution against the hysteria which ascribes to oral diseases the cause of unnumbered ills may not be out of place. There can be no doubt that there is, in not a few instances, a disposition on the part of both dental and medical men to overestimate the rôle which these infections play as causative factors in more serious diseases, and in certain cases to ascribe to them etiological relationships, the correctness of which it would be difficult, if not impossible to establish. For example, the physician consults the dentist in a case of chronic arthritis of several years' standing. A dental exam-

ination reveals the presence of several non-vital teeth. These are radio-graphed and give evidence of disturbance, ranging all the way from a slight rarefaction to clearly defined blind abscesses. These teeth have been filled for years, and there is no history of trouble since. Knowing as we do that the infection which takes place in the joints is always hematogenous—that is, takes place via the blood stream—and that a certain per cent. of periapical infections are also hematogenous (what per cent. no one knows), how is anyone to know whether or not both of these infections may not have resulted from a general bacteriæmia of mild type, and that they both have developed coincidentally with the same cause? Also, if the joint infection antedated that in the jaws (as it may have done), may it not have actually caused the latter? This is only one of several questions regarding the etiological relationship of these infections which cannot at present be answered. Until more light is thrown on these interesting problems no one can afford to be dogmatic.

As a result of this over-enthusiasm, teeth are extracted which are innocent in offense, and patients otherwise subjected to treatment wholly unnecessary. Calling attention to the wholesale removal of the tonsils following the discovery of the relationship of tonsillar infections to those occurring in other parts of the body, Gilman says (15): "A similar fad is growing relative to the removal of teeth since the discovery that jaw abscesses and pyorrhea alveolaris are equally potent as foci for secondary infection as are the tonsils. Some physicians are rather indiscriminately sending their patients to the extracting specialist, requiring removal of several or all of the teeth, supposing them to be a factor in some lesion, when their removal is not always justified."

Let us be sane in the matter, not forgetting that other infections are quite as likely to be responsible for the systemic disturbances as are those resident in the mouth. When consulted by the patient or his medical adviser, one should therefore be cautious about overconfidence in prognosis as regards secondary infections. They by no means always clear up after the infection in the mouth has been removed. Apropos of this, Billings says (9): "I think we should not use the word 'cause' too much in relation to the focus of infection of a systemic disease. We should not, even with the focus before us, say that that focus is the absolute cause." There can be only one safe and dignified course for the dentist to follow in these cases, and that is to advise the conservative eradication of all such foci from the mouth.

In the treatment of these cases there must be closer co-operation between dentist and physician. The latter, suspecting a dental complication, can no longer dismiss his patient with "Go and see your dentist." That the more progressive physicians are realizing this is evident from

the following quotation by Camac (12): "In using the term co-operation, I do not mean to infer that the patients were told to consult the dentist merely, but I accompanied them to the dentist's office, and studied with him the radiographs and local conditions. I believe such consultations to be as necessary as those common between surgeon and internist. When a pyogenic dental infection requiring liberation of pus existed, arrangements were made for bacteriological specimens to be procured at the dentist's office, and later, if conditions indicated, a specimen of blood for culture and complement fixation tests was taken. A certain number of dentists are in accord with this practice; indeed, a small number have gone beyond the medical practitioner, and without his co-operation are studying cases with just such thoroughness as outlined above."

It is equally important that the dentist seek the co-operation of the physician in the treatment of these cases, since he may, with no knowledge of the secondary infections which may exist, eradicate a focus of infection, thereby making it impossible to obtain a culture of the very organisms responsible for the lesion and from which an autogenous vaccine could have been made.

Since the physician's responsibility is greater than is that of the dentist, it is his privilege, with the patient's consent, to call in consultation whomsoever he feels can best co-operate with him in the treatment of these cases. If this happens not to be the family dentist, the family dentist can have no cause for complaint. As Dr. Camac has said, there are a certain number of dentists who by their study of these cases have fitted themselves for such co-operation. He also says: "There is, however, among the dentists a large class of dental tinkerers who practice upon the easy persuasibility of the public."

This, unfortunately, is also true, and places upon the physician no little responsibility in the selection of a dental consultant.

Micro-organisms from mouth infections find their way into the circulatory system via the gastro-intestinal tract and by direct absorption. Pus that is discharged into the mouth and swallowed is less likely to cause trouble than is that which finds its way into the blood stream direct, which explains in part why it is that fistulous abscesses and pyorrhea alveolaris with free drainage are often less pernicious in their influence than are those infections in which the organisms are confined.

Under normal conditions, bacterial proteins are broken up by the digestive ferments of the gastro-intestinal tract into non-protein split products, mostly amino-acids. As a result, the poisonous group, not readily diffusible, is rendered inert. (3) Adami says (1): "When, however, there is gastritis with arrest of secretion or diminution of the H. cl., the same is no longer true. Then not only are the bacteria not

destroyed, but escaping into the small intestines they find the alkaline contents of the same a favorable medium of growth, and proliferating, may by their products induce extensive irritation." This further explains why pyorrhea in one case compromises the health of the patient while in another there is no such evidence. Regarding the bactericidal action of the gastric secretions, Mayo says (2): "We have long looked on the acids of the stomach as destructive to mouth bacteria, but Smithes, in a microscopical examination of gastric extracts from 2,406 different individuals with stomach complaint (dyspepsia, indigestion, and the like), showed that irrespective of the degree of the acidity, bacteria were present in 87 per cent."

When such impairment exists, the bacteria are not destroyed by the gastric ferments, but find their way into the blood and tissues as unbroken proteins, where they must be digested by the body cells. This is done by the elaboration of a specific proteolytic ferment, the cleavage action of which liberates within the tissues themselves, the poisonous atomic group common to all proteins and giving rise to those phenomena which with certain modifications characterize all infectious diseases. (3).

The bacteriology of mouth infections is not unlike that of the normal mouth flora. These organisms, especially the coccis group, when grown under changed cultural conditions, such as prevail in alveolar abscesses, deep pyorrheal pockets, tonsillar crypts and the like, undergo transmutation (20), as a result of which their virulence may be greatly increased. The principal factors in this change seems to be animal passage and lowered oxygen tension. (17) As a rule, bacteria grow best in free oxygen. They may, however, exist in the complete absence of free oxygen, and a small number can only grow when free oxygen is altogether absent. (1). As a result of these changed cultural conditions, bacteria also acquires a selective affinity for other tissues, such as the gastric mucosa, the endocardium, cartilages, etc. Some subtle change takes place which may best be explained in Rosenow's own words (4): "One striking thing in connection with some of the more chronic infections is that the character of the micro-organisms found in the lesion may be quite different from the character of the micro-organism found in the focus of infection at the same time. My study on the effect of varying degrees of oxygen tension on the members of the streptococcus group, together with other facts, makes it likely that it is in the focus of infection that changes in virulence occur, and the different affinities for various structures are acquired. In other words, the focus of infection is to be looked on not only as the place of entrance of the bacteria, but also the place where the organism acquires the peculiar property necessary to infect. In the light of our present knowledge, the argument that



infections in the mouth are so common in individuals in apparent health does not minimize their importance. These or other foci are so common in patients suffering from arthritis, neuritis, appendicitis, ulcer of the stomach, cholecystitis, goitre, etc., and so rare in individuals who have had superb health for years, that their direct etiologic rôle can scarcely be questioned."

Among the more common diseases which may result from mouth infections are digestive disorders, including gastric ulcer, arthritis, anaemia, endocarditis, functional disturbances of the kidneys and malaise. This last can hardly be called a disease, but a symptom of disease. It is surprisingly common in all classes of mouth infection. In view of the interest which all must feel in the etiological relationship of mouth infections to systemic diseases, a brief consideration of a few of the more common may be helpful.

Arthritis is one of the most common of these.

**Arthritis.** It is essentially an inflammatory process caused by infection, the effect of which depends upon the virulence of the infecting organisms, the constancy of their supply, and the defensive forces of the body cells. It frequently occurs as a result of general infections. In thirty-eight cases of arthritis deformans, Rose-now (13) excised the lymph nodes, draining the involved joints, making cultures from them, reserving portions for microscopic study. Organisms were found in all but three cases where the disease had existed from two to seventeen years. Streptococci were found in fourteen cases, and a streptococcus like organism, completely or partially anaerobic, in nine cases. A significant feature was that microscopic sections of the adjacent muscle tendon and articular capsule in several of these cases showed a complete plugging of the blood vessels as a result of endothelial proliferation. It was in these areas that bacteria were found. He concludes: "For these reasons the changes observed in the blood vessels about the infected joints may be regarded as primary rather than secondary, and it would seem as though in arthritis deformans, the micro-organisms are taken up from the circulation by the endothelial cells which proliferate freely so that eventually the blood supply is reduced or cut off, in consequence of which there results areas of lowered oxygen tension, diminished nutrition and atrophy. Such conditions would favor the growth of organisms which on isolation are sensitive to oxygen."

Here we see the possible relationship which chronic mouth infections may sustain to arthritic conditions. The organisms associated with mouth infections belong to the cocci group; they are constantly finding their way into the circulation; they undergo certain changes by which

they may become partial or complete anaerobic, and they exercise an irritant effect upon the endothelial lining of the blood vessels, causing a proliferation of these cells, and a more or less complete plugging of the capillaries of the joints with consequent impairment of nutrition. Experiments have shown that diminished blood supply will of itself cause the changes peculiar to arthritis deformans in the joints of animals. (9) (13).

Among the chronic infections which may be responsible for these conditions are pharyngitis, tonsilitis, pyorrhea alveolaris, cholecystitis, gonorrhea, endometritis, sinusitis, alveolar abscess, and phthisis. It should not be forgotten that arthritis is a secondary infection, and that intelligent treatment consists in the localization and removal of the primary focus. This should be done early, for after the joints become deformed, the patient may become a hopeless cripple in whose case treatment may avail little. Milne says (11): "Some inflammatory focus may be found which may be the etiologic factor, and by the cure of this condition the joint disease may become limited or cured. One must not, of course, because some infective focus, such as pyorrhea, for example, exists, immediately conclude that it is the cause of the arthritis. All possible sources of infection must be searched for and treated accordingly. It is remarkable, however, how many cases of progressive arthritis, which may for long be only a recurrent synovitis, but which tends eventually to develop into profound arthritis deformans, are due to pyorrhea. In this case certain streptococci of comparatively low grade pathogenicity are the usual cause of the joint changes."

**Digestive Disturbances.** Disturbances of digestion as a result of mouth infections are not uncommon. Unfortunately, there

is little knowledge of an exact nature to indicate what this relation is, or how it operates. In most instances the disturbance is functional, which may for long be little more than a chronic dyspepsia. If neglected, it is impossible to anticipate the possible consequences. We have seen that organisms which are swallowed are less liable to give trouble than are those which find direct entrance into the blood stream. We have seen also that when the gastric secretions are subnormal, the organisms are not destroyed, and that the bacterial poison may find its way into the circulation. Since in many cases it is probably only a question of time when the gastric secretions are broken down under the constancy of the bacterial supply, it is of the utmost importance that the mouth be kept clean and healthy. It is not improbable that many abdominal lesions are directly or indirectly traceable to infection located in the mouth. (16). It is also true that mouth organisms may cause gastric ulcer via the circulation. Rose-

now says (10): "The supposed relation between infected tonsils or gums and gastric ulcer may be due not to the swallowing of the bacteria, as usually supposed, but to the entrance into the blood of streptococci of the proper kind of virulence to produce a local infection in the walls of the stomach," due to their selective affinity for this tissue.

Anæmia is not infrequently associated with **Anæmia.** mouth infections due to the hemolyzing action of the organisms which find their way into the blood from

these foci, where they act upon the red blood cells, leading to their dissolution with liberation of the contained hemoglobin. Certain of these cases are associated with depression which may develop into chronic melancholia. Craig says (7): "The continued swallowing and absorption of pus is undoubtedly the cause of disorders of digestion, headache, and finally an anæmic condition almost cachectic. This depleted, exhaustive state may often be associated with a melancholic state. It seems a far cry from mouth infection to mental disease, but when one witnesses profound depression clear up following the drainage of several alveolar pus pockets, one is persuaded that the chronic intoxication, the result of absorption from the pent-up infectious process, was an etiologic factor."

Malignant endocarditis (9) caused by the streptococcus viridans, headaches of a rheumatic type (6), pachymenigitis (7), myositis (9), are all examples of diseases in which mouth infections may play an etiological rôle.

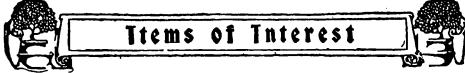
No one with any appreciation of the meaning of all this can fail to be impressed with the responsibility which rests upon the dentist in the prevention and treatment of oral infections. Nowhere in the body is the opportunity for prevention so great as in the mouth. With proper care (which would involve a co-operation on the part of the patient at present unattainable), alveolar abscesses could be prevented with the possible exception of that small per cent. which might result from trauma. If tooth extraction were as limited as it might be, bridgework would be eliminated, as would the filth so often associated with it. Pyorrhea alveolaris always begins in an insignificant irritation at the gum margins, the removal of which would prevent its development with all its disastrous consequences in 90 to 100 per cent. of cases. It is true that it is not possible at present to obtain the co-operation of even those who patronize the dentist with more or less regularity to achieve all these results. The public must therefore share with the dental profession the responsibility for these conditions. But (and I say this in no spirit of criticism) a tremendous responsibility rests upon the dental profession, a responsibility far greater than that which rests upon their patients, and one which they have not met. It is a fact that in many instances the mouths of their patients are

not kept clean, that they are not instructing them in the proper care of their own mouths; that they are introducing into the mouth crowns and bridges which cannot be kept clean; that they are more or less indifferent to chronic alveolar abscesses, and are still telling their patients that pyorrhea is an incurable disease.

Right here lies the foundation for the charge that the dentist is only a mercenary tinkerer, who in looking into the mouth sees only the holes in the teeth, with no thought of the service he may render. The dental profession should be the guardians of the health of the mouth, and indirectly minister to the health and well-being of every patient whom they serve. No dentist worthy of his high calling can be indifferent to the hygiene of the mouth, can neglect those preventive measures, the observation of which would probably do more to elevate the standard of health than any single thing that could be done.

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## The Panama Pacific Dental Congress.

It may be said that the Panama Pacific Dental Congress was a success. Indeed, considering the fact that the total membership was quite up to expectation; that the attendance at sections where papers were read was very materially greater than at any other congress held in this country, and better than at the London Congress, where, as in this case, the great war interfered with the international character of the gathering; remembering, too, the exceptional quality of many of the papers presented and the number and nature of the clinics, it is not too much to say that this congress will always be counted as one of the most successful within the history of dentistry.

No building, perhaps, exists in the entire world better adapted to the needs and purposes of such a congress than the Civic Centre Auditorium. The new Civic Centre, in San Francisco, occupies a large plot immediately west of the old brown stone pile which served as the City Hall until burned during the great conflagration. Perhaps no greater proof of the indomitable will of this stricken people to rise above misfortune can be found in any other spot. Standing *vis-à-vis*, we see the ruin of the old, and the majestic and imposing new white marble Municipal Building. To the south of this Civic Centre, and therefore facing the north, is the beautiful marble building, the Auditorium, which, with its many and spacious halls, assembly and lecture rooms, easily accommodated under a

single roof all the general and section meetings, exhibits and clinics, as well as affording rooms for fraternities, committees, local societies, etc.

Too much praise cannot be bestowed upon the various committees in immediate charge of the management of the congress. Full and satisfactory plans had been prepared in advance against every contingency, and where these prearranged plans were carried out, all went with attractive smoothness. Exceptions to the general rule occurred only when committees yielded, perhaps unwise'y, to selfish demands of essayists and clinicians.

Men who attend dental congresses, having promised to read papers or give clinics, should present themse'ves ready and willing to co-operate with the prearranged program. Those that besiege the members of the committees, urging that a different day or hour would better suit their individual conveniences, place their own selfish desires above the rights and privileges of others.

And perhaps as germain to this general subject it may be said that in the future rules should rigidly discountenance the practice of appearing on the printed program and then not appearing in person. There are two styles of delinquents in this class. The most reprehensible is the man who promises a paper and then absents himself without even sending his paper. The other is the man who, like the first, permits his name to appear on the program and then merely sends a paper for some one else to read and defend; or perhaps to be read by tit'e, yet expecting it to appear in the published transactions. Of course, occasionally one may honestly anticipate being present and illness of himself or some member of his family may occur to prevent. Possibly exceptions might be made when the excuse for non-attendance is a valid one. Yet we might perhaps well pattern our conduct in such circumstances upon the rule of the American Medical Association, at whose meetings, in the absence of an essayist when called, a paper is passed; nor is it published with the transactions, not even illness being accepted as excuse for this transgression.

**Opening of  
the Congress.**

The Congress was opened promptly at 1:30 P. M. on Monday, August 30th, the large Assembly Room being crowded. Addresses were made by State, City and Exposition officials, and responses were offered

by Dr. Frank L. Platt, President of the Dental Congress; Dr. Don M. Gallie, President of the National Dental Association; Dr. Truman W. Brophy, President Federation Dentaire Internationale; Dr. Burton Lee Thorpe, and by delegates from foreign countries.

Two incidents which occurred during the exercises were of special interest. One, the particularly warm greeting awarded to Dr. Florestan Aguilar, responding for Spain, who was the only European present who had risked crossing the war zone erected by Germany. During the course of his remarks, Dr. Aguilar called attention to the fact that because of the war, Dr. Truman Brophy and himself are now the only two men who have never missed attendance at an International Dental Congress.

The second moment of intensity was when Dr. Younger was unexpectedly seen to enter the hall. He was at once vociferously called for, but when compelled to step up onto the stage was so touched that in response all he could say was: "My friends, I am glad to be at home once more."

**Receptions  
and Balls.**

On Monday evening there was a reception for all members of the Congress, with their wives, daughters, sisters and sweethearts, at the California

Host Building, at the Exposition Grounds. The reception was followed by a grand ball, and the men with their women folk made an imposing company. A second ball of the same character was held in the same place later in the week on invitation of the Psi Omega Fraternity.

**Section  
Meetings.**

The section meetings in the main were unusually well attended. Naturally, with ten sections in operation, it was not possible for one man actually to attend all or even many of the meetings, and it would therefore be exceeding bad taste to attempt any comparison of the values of the papers read. There was one, however, which the writer was fortunate enough to hear, to which he cannot refrain from calling special attention. This was a paper entitled "Chronic Peridental Infections—The Value of Blood Examination as a Diagnostic Aid," presented in Section VI by Dr. W. H. G. Logan.

During the past two years we have heard much, very much, about systemic disease caused by periapical and other oral infections, but it must be admitted that in spite of all that has been presented, no absolutely final proof has been produced. There has been much theorizing and many case histories have been recorded from which it appears to be a fairly safe presumption that there is a causal relation between oral infections and many systemic diseases.

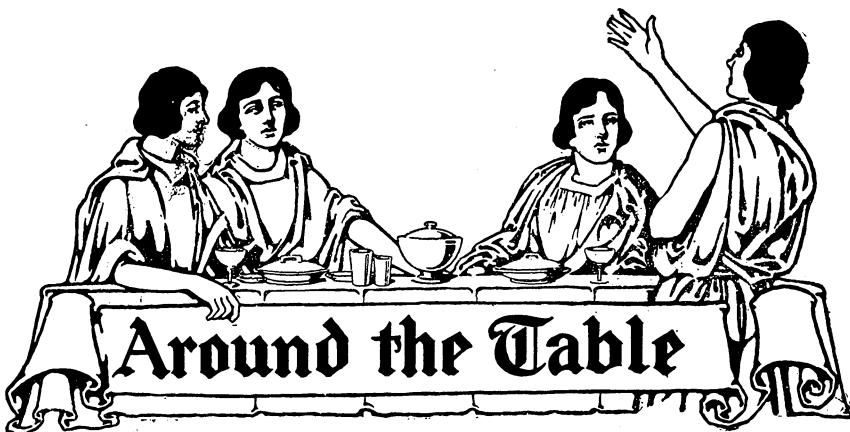
Dr. Logan seems to have brought forward the most trustworthy evidence yet presented. In over a hundred consecutive (not selected) cases passing through his hands, where systemic disturbance has been accompanied by a mouth infection of some kind, he has made a blood examination before operating upon the mouth lesion. Subsequently, other blood examinations were made, and while it is impossible here to note all of his deductions, the important point is that with the clearing up of the mouth infection there has invariably been an improvement in the story disclosed by the blood. It would seem reasonable then to depend somewhat upon this method to determine whether or not one really has been successful in eradicating a mouth infection.

Before closing this rather inadequate account of what was a really fine dental meeting, we must not overlook mention of the Souvenir Program.

**The Souvenir Program.** This was indeed an *edition de luxe*. A volume of nearly two hundred pages, profusely illustrated in tone and tint, each page embellished with a beautiful border in ink of a color different from that used for the text, this was indeed an example of work of which the printer well may be proud.

The contents, too, containing as it does besides the programs of meetings, sections and clinics, many well written and exceptionally interesting articles on dentistry in various other parts of the world, in our own country, in our Army and in our Navy, reflect credit upon the committee and editor who compiled it.

In final conclusion, the dentists of this country owe the men of California a debt of gratitude for staging this exceptional meeting.



SINCE LAST RECORDING a talk Around the Table, I have chinned with

- ❖ the men from China, and chatted with the fellows from Chattanooga; I
- ❖ have dined with Fraters in Pullman diners, and supped with superior
- ❖ fellows from South America. In short, I have been to the Congress
- ❖ in Frisco. Later I shall have stories to tell, but first I must be fair
- ❖ to those members of the Club who have written to me during my
- ❖ absence, and the very first letter compels me to admit that I did not
- ❖ have the pleasure of hearing Dr. Horace Howe, of Boston, read his
- ❖ paper, entitled "Importance of Mouth Hygiene During Infancy and
- ❖ Early Childhood." Fact is, there were ten sections and over a hundred
- ❖ papers. Verbum Sap., as my Latin professor was wont to say when
- ❖ he had no better explanation.



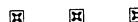
REALLY, I AM CHAGRINED to think that I did not hear Dr. Howe's

- ❖ paper, because my correspondent asks me to discuss the subject. It
- ❖ seems that the *Boston Post* has had something to say, and my friend
- ❖ from Somerville, Mass., thinks the *Post* should not have the last word.
- ❖ On the sixth day of September the *Post* had this to say:



"THE STATEMENT THAT CANDY is as harmful to children as liquor

- ❖ is to an adult, reported to have been made by Dr. Horace L. Howe,
- ❖ of Boston at the Panama Pacific Dental Congress, was yesterday declared
- ❖ by Boston physicians to be absurd. Contrary to its being harmful to chil-
- ❖ dren, the eating of candy was said to be necessary for the proper growth
- ❖ of the child, and that good candy has no deleterious effects whatever.



"DR. THOMAS F. HARRINGTON, medical deputy of labor and industry,

- ❖ said that the eating of candy of good quality is as necessary for the
- ❖ sustenance of the growing child as any other form of food. 'Sugar is
- ❖ one of the most valuable and necessary forms of food in the develop-

❖ ment of the healthy body,' said Dr. Harrington. 'Of course, like every-  
❖ thing else, the practice of eating candy can be abused, but eaten in  
❖ moderation it can have no ill effect.'

■ ■ ■

INTERRUPTING A MOMENT, I think the same can be said of whiskey.

■ ■ ■

"DR. DAVID D. SCANNELL, a member of the School Committee, said  
❖ that in his opinion the eating of candy is entirely beneficial to children.  
❖ He added that it is not the eating of candy that causes decay of the  
❖ teeth, as was charged by Dr. Howe, but rather the neglect of proper  
❖ care in keeping them clean."

■ ■ ■

MUST INTERRUPT the *Post* again to announce that the Forsyth Dental

❖ Infirmary will inaugurate a school for Dental Hygienists, beginning  
❖ October 4th. This surely will please Dr. Scannell, of the School Com-  
❖ mittee, because it is chiefly among school children that the dental  
❖ hygienist will find her work. But the *Post* has more to say:

■ ■ ■

"A STATEMENT by Dr. Howe that no candy store should be allowed in  
❖ the same neighborhood with a school any more than should a saloon,  
❖ was declared by Dr. Francis D. Donoghue to be entirely inconsistent.  
❖ 'There is a definite and tremendous danger in liquor, and to attribute  
❖ a like danger to candy is absurd. Candy is the least of the sources of  
❖ danger to children. From a physiological viewpoint, candy, or some  
❖ other form of sugar, is absolutely necessary to the welfare of the child.'

■ ■ ■

VERY TRUE, AND VERY LIKELY if all candy were all sugar, and if  
❖ candy were administered to the child in physiological doses, the results  
❖ might be entirely physiological. It is quite true that the child must  
❖ have his quantum suf. of sugar, but as he gets sugar in tea, in coffee,  
❖ on cereals in the morning, and in pies and puddings after dinner, not to  
❖ mention the jam on his biscuit at night, is it not just possible that candy,  
❖ if restricted even to purest sugar, which it seldom is, might provide the  
❖ youngster with more saccharin material than is physiologically required?

■ ■ ■

HOWEVER, IT IS NOT my purpose to reply to the learned M.D.'s. from the  
❖ Hub, but rather to invite others better informed than I to do so. Still,  
❖ I may repeat an old epigram, which must have at least a grain of sense  
❖ in it, else it could not have lived to such a respectable old age.

■ ■ ■

THE EPIGRAM READS THUS: "When there is a liquor saloon on one  
❖ corner, and a candy store in the middle of the block, it is quite natural  
❖ to find a drug store at the other corner."

■ ■ ■

DR. FREDERICK J. SHADDOCK, of Rochester, writes as follows: "In  
❖ the August issue Dr. L. H. Gilbert describes a method of cutting sen-  
❖ sitive cavities with less pain, saying: 'The major part of the pain is  
❖ produced by the frictional heating up of the bur'; and his method is  
❖ to play a stream of cold water upon the bur while operating, the saliva

❖ ejector drawing off the surplus. Yes! Good! But there is a little  
 ❖ more scientific way. My preceptor, Dr. R. H. Hofheinz, lectured to me  
 ❖ twelve years ago in college regarding bur heat, and declared that sharp  
 ❖ burs produce less heat than dull ones. Also that by occasionally dip-  
 ❖ ping the bur in carbolic acid, and then using it in the cavity, we have  
 ❖ the bur lubricated to the extent of preventing much friction, surely less  
 ❖ than when using water, carbolic being an oleum. Moreover, the proto-  
 ❖ plasmic contents of the tubuli which conduct the pain being coagulated  
 ❖ by the carbolic, we reduce the sensitiveness to the minimum, have our  
 ❖ field of operation constantly sterile, the infected area well disclosed by  
 ❖ the carbolic, and all the time be freer in our work than if using a spray,  
 ❖ causing water to splash all around."

■ ■ ■

ON THE SAME SUBJECT, Dr. Frank Bliven, of Worcester, Mass., con-  
 ❖ tributes the following comments for the delectation of the fellows  
 ❖ Around the Table: "After reading Dr. Gilbert's method of using a  
 ❖ stream of cold water upon the bur, I think that would be a very safe  
 ❖ place to use it, for I am confident if it was put into the cavity of some  
 ❖ of my patients the landlord would have to repair the roof; besides I see  
 ❖ no necessity of keeping the bur cool. A sharp bur at high revolution  
 ❖ and the impact no harder than is necessary to cut and clear will pre-  
 ❖ vent the bur from heating. To the best of my knowledge I am the  
 ❖ first man in this country to run a dental engine by electricity success-  
 ❖ fully, and have used as high as 7,500 revolutions a minute, and, as the  
 ❖ saying goes, 'The higher the fewer.' For excavating sensitive dentine  
 ❖ I found this to be a very practical degree of speed, but pretty hard  
 ❖ upon the hand-piece and difficult to obtain in the motors manufactured  
 ❖ to-day. I had mine wound especially for 5,000 revolutions, which is  
 ❖ considerably higher than those generally in use. I find there are a few  
 ❖ men who appreciate the value of high speed and trust these words will  
 ❖ quicken a few others to experiment with it for the benefit of the suf-  
 ❖ fering public."

■ ■ ■

"SOME MONTHS AGO I purchased a Rogers High Frequency outfit and  
 ❖ have been able with it to reduce cavity sensitiveness to a point within  
 ❖ the limits of comfort by applying the current to a piece of cotton  
 ❖ saturated with carbolic acid from one minute to a minute and a half.  
 ❖ Patients have frequently expressed their relief and have stated they  
 ❖ did not think they could have had the tooth excavated without it. I  
 ❖ kept an analgesia outfit in the office for six months, and finding no use  
 ❖ for it I was very glad to dispose of it with a loss of only ten dollars.  
 ❖ As Tokio says, 'Wish you the same.'"

■ ■ ■

AFTER DESCRIBING Dr. Gilbert's scheme in the August number, I intro-  
 ❖ duced the following paragraph, repeated there because of a comment  
 ❖ it has brought forward:

■ ■ ■

"ANOTHER LITTLE METHOD of which Dr. Gilbert's proposal reminds  
 ❖ me is accomplished with a device constructed by Dr. Van Woert. By

- ❖ the way, that Van Woert person has a lot of good ideas. In this particular case he has a tiny metal tube soldered to his handpiece in such a manner that the end of the tube is directed toward the bur. To the other end of the metal tube is attached a small rubber tubing leading to the compressed air outfit. When using the bur, the compressed air is turned on and a stream of cold air keeps the bur and tooth cool and the cavity clear of dust."



IN REGARD TO THE ABOVE, Dr. C. Edmund Kells voices his views as follows: "Yes, Van Woert has a lot of good ideas, many of which are original, but the one you report happens to have been originated by Yours Truly in 1886, and published in 1887. How is that for ancient history? See Johnson's Text Book, second edition. And here is a secret; don't divulge it. I got up the stunt, it is true, but it is not worth a cuss." (My! My! And cusses so cheap these days, too!) "I used it a short time only. An assistant operating the air stream is a thousand times better proposition."



NOW IT IS ONLY FAIR to Dr. Van Woert to admit that he never told me the little appliance was original with himself. Every time I go to his office he has some new and useful device, and as he makes them all himself, I just naturally take it for granted that he originates them. He does, most of them. As to the utility of the scheme, I just thought it must be good, or Van Woert would not be using it. Never tried it myself.



WHILE WE ARE DISCUSSING the general subject of operating on sensitive cavities without pain, I may as well introduce here a communication from Dr. Josef Novitsky, of San Francisco, who writes as follows: "In view of the fact that some interest will undoubtedly be aroused in obtunding pastes by your publishing of Dr. Buckley's paper in the December 'Items of Interest,' I would like to call attention to a formula that I worked out four years ago and have been using in my practice with great success ever since. I communicated the formula to the San Francisco District Dental Society in open meeting on May 12, 1913—a year and a half before Dr. Buckley's paper appeared. It was published in the *Pacific Dental Gazette* of September, 1914. This, you will observe, was still thirty days before Dr. Buckley's address before the New York Society. In the meanwhile, the formula had been offered to Dr. Kirk, of the *Cosmos*, for publication on July 23, 1914. The formula is as follows:

- ❖ Urea Hydrochloride and quinine.....gr. 20
- ❖ Paraformaldehyde .....gr. 15  
(The latter should be 20 grains instead of 15  
grains if strong action is desired.)
- ❖ Thymol .....gr. 20
- ❖ Zinc Oxide .....gr. 60
- ❖ A little of the 'putty' is sealed in the cavity for from one to three days, after which the tooth is quite insensitive. It will be seen that this is very similar to the mixture used by Dr. Buckley. It does not conflict with the Harrison Narcotic Law and has the great advantage of cheapness. Time and experience will have to decide whether the substitution of neothesin for quinine urea is of any advantage."



## Cracking Nuts with the Teeth.

Editor ITEMS OF INTEREST.

*Dear Sir:*

I beg of Reginald Sayre, M.D., the privilege to comment on his "Criticism of a Mouth Hygiene Educational Film," which appeared in the July issue.

Harking back to boyhood days, I recall that the school text-book, under care of the teeth, warned us not to crack nuts with our teeth, nor to pick them with pins. However, I have yet to see a sound tooth which has been injured in either way. The experience of dental practitioners generally is similar.

This question of nut-cracking has been exalted to a position of importance in the minds of the laity, when, in truth, as a factor in tooth destruction it is well-nigh negligible.

Dr. Sayre is correct in his inference that "if you kept your mouth clean and your teeth in good condition you would be enabled to crack Brazil nuts." You would, with "impunity" or otherwise. This is not to say that it is wise or desirable to use our teeth as nut-crackers, but to emphasize the fact that the underlying fallacy is the presumption that Nature has provided us with masticatory muscles so powerful as to be able to crush the teeth, rather than the truth that Nature's equilibrium endows us with teeth so strong as to withstand any stress—barring accidents, and they are rare—that the muscles of mastication can put upon them.

We have no tales of broken teeth among our aboriginal Indians, yet I doubt not but that they exercised them on hickory nuts and venison and buffalo bones. Where one tooth is injured by the nut-cracking practice, thousands invite decay and destruction by the lack of vigorous use. Bakers' bread, for instance, which forms a gummy mass that adheres to teeth accustomed to genteel and indifferent mastication, does more toward injuring the teeth than all the nuts on or off the market.

It is not misuse, but disuse that constitutes the greater evil. The tooth that fears the cracking of a pecan, or even a Brazil, has much need of floss and toothbrush. The slogan that "a clean tooth never decays" should be anteceded by "an unused tooth seldom is clean."

J. W. PEROUTKY, D.D.S.

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### Treatment of Impacted Third Molars.

Editor ITEMS OF INTEREST.

Dear Sir:

I have just finished reading the very interesting article, "Wisdom Teeth," by Dr. John D. Thomas, of Philadelphia, which appeared in the August number of ITEMS OF INTEREST. I am in accord with his paper up to his classification of the wisdom teeth, and really I have no fault to find with that; in fact, I think it is a distinct advantage to have the various ramifications of this most troublesome tooth classified, and it is the first time to my knowledge that I have seen them thus qualified; but it is with his treatment of these variously impacted teeth that I most thoroughly disagree. The ruthless manner in which the Doctor speaks of extracting the second molar to get relief from an impacted third molar is appalling. Every dentist knows that there is very small probability of a deflected or impacted third molar righting itself as the result of the extraction of the second molar; in truth, the very reverse is more than likely to be the result, and the patient by this procedure secures relief from pain, but loses two molars instead of one. Of course, it requires skill to remove a badly impacted third molar, and the removal of a great many of them might be and are rightfully classed as "major surgery," but this should not deter the exodontist who is not willing that his work should be so circumscribed that he becomes a mere puller of teeth. My experience has been that the general surgeon is very glad to turn this work over to the dentist who can do it, and my observation has been that the exodontist who is willing to prepare himself in all phases of the surgery and anesthesia required will do better work than the general surgeon for several reasons:

- 1st. He is better able to recognize and diagnose dental lesions.
- 2nd. Because he is making a specialty of that branch of oral surgery.
- 3rd. Because he places a higher value upon the teeth and their surrounding tissues.

This last reason has been forced home to me upon more than one occasion by the presentation of patients who had gone to general sur-



geons to have impacted wisdom teeth removed and had had almost everything else in the oral cavity removed but the wisdom tooth.

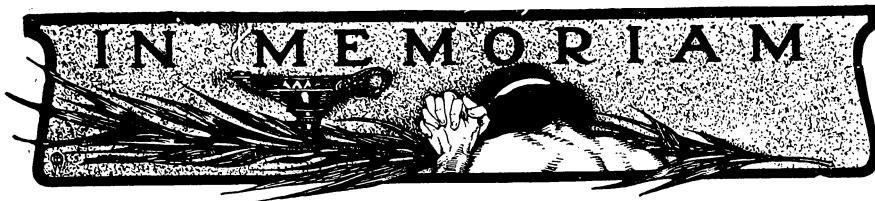
I have seen the general surgeon make major surgery out of a simple alveolar abscess. I have seen him also go through the cheek to reach a dental cyst in the antrum that might have been cured by the removal of some badly decayed roots of teeth and the subsequent drainage thereof. This, of course, is no worse probably than the dental surgeon would do who attempted to practice gynecology. Why, then, should the dentist who professes to make this work a specialty send it to one who does not.

Neither do I agree with the Doctor that impacted teeth are the innocent sojourners in a weary land that he represents them to be. We have abundant clinical evidence to prove that they may be the cause of headache, neuralgic pains in the eye, ear and head, chorea, epilepsy, hemiplegia and other forms of paralysis and degeneracy. And the exodontist who couples this knowledge to his experience and skill becomes a diagnostician, a valuable aid and co-worker with the physician and general surgeon, and not a mere puller of teeth "and easy ones at that, too."

DR. W. I. JONES.

Columbus, Ohio.





### Dr. Greene Vardiman Black.

Dr. G. V. Black died at Walnut Lodge, his boyhood home, at 4 P. M., Tuesday, August 31st. His long and useful life covered a period of seventy-nine years, and for more than a half century he devoted practically his entire thought and energies to the development of the scientific and practical problems of dentistry.

The death of Dr. Black was caused by pernicious anæmia, with which he had been afflicted for some time. While spending the summer in Duluth, Minn., his condition became worse. During a visit of his son, Dr. Carl E. Black, he expressed a great longing once more to visit the scenes of his childhood, and so Dr. C. E. Black took his father with him to the farm home southeast of Virginia. This was Tuesday, August 17th, just two weeks before he died. For a time after his arrival at the home the aged invalid seemed to improve, but later his condition became critical, and it was thought best to notify the absent members of the family.

Dr. and Mrs. Arthur D. Black, their son Gilmer, and Miss Clara Black were all in California at the time of receiving the telegram concerning their father's condition, and hastened at once to his bedside. For several days preceding the death of Dr. Black all the members of his family were with him.

Greene Vardiman Black was born in Scott County, Illinois, near Winchester, August 3, 1836. He was the son of William and Mary Black, and a great-grandson of Capt. William Black, an officer of the militia in North Carolina just before the Mecklenberg Rebellion, and one of the first officers to refuse to take the oath of allegiance to the British crown. The father of Dr. G. V. Black was born in Milledgeville, Ga., in 1796. In 1825 he went to Tennessee, and there was married to Miss S. Vaughn, removing to Scott County, Illinois, about nine years later. After residing for ten years in Scott County, in which period the subject of this sketch was born, the family removed to Cass County, settling seven miles southeast of Virginia, on the farm that has ever since been



## IN MEMORIAM

associated with the family name, and where Dr. G. V. Black passed the last few years of his life.

The boyhood of the deceased was passed on his farm in Cass County, and it was always a dear spot to him. Many of his summers were passed there during his long professional career. Last year he was there for several weeks, and it was with great reluctance that he left in the fall for his home in Chicago.

At the age of sixteen Dr. Black left the farm for a time and made his home with his brother, Dr. T. G. Black, of Clayton, Ill., who served as lieutenant-colonel in the Civil War, and was twice elected a member of the State Legislature. With him the younger man read medicine, and for a time served as postmaster of the village. At the age of twenty-one he began the study of dentistry with Dr. J. C. Speer, of Mt. Sterling. Afterward he established a dental office in Winchester, where he remained in the practice of his profession until 1862. In 1860 Dr. Black was married to Jane L. Coughennower, who died August 26, 1863. In 1865 he was married to Miss Elizabeth Akers Davenport, who survives him, together with the following sons and daughters: Dr. Carl E. Black, of Jacksonville; Miss Clara Black, of Chicago; Dr. Arthur D. Black, of Chicago, and Mrs. Mark Baldwin, of Duluth, Minn.

Dr. Black served in the Union Army during the Civil War with the rank of sergeant, and was engaged most of his time on special scout duty. He received an injury to one of his knee-joints while in the service which kept him for six months in a hospital in Louisville, Ky.

In 1864 Dr. Black opened a dental office in Jacksonville, and at first applied himself to the study of chemistry, establishing a complete working laboratory in connection with his dental office. He organized a class in chemistry among the public school teachers of the city, which he taught several years. He also took a prominent part in the medical organizations of the city and county.

Dr. Black, even in the earlier years of his professional career, became known as an author and lecturer on scientific topics pertaining to dentistry. Since then he has become world-renowned, and his writings have been translated into many languages and are standard authorities on the subjects which they discuss. A prominent feature of all of Dr. Black's writings are the numerous original drawings they contain.

**Banquet  
In His Honor.**

In recognition of his distinguished services to the dental profession, a banquet was given in Dr. Black's honor January 29, 1910, in the gold room of the Congress Hotel in Chicago by the Chicago

Dental Society. At this assemblage four hundred representatives were present from Canada, Europe, South America, Australia, and every part of the United States, to do him homage.

In experimental work, in invention, as the author of hundreds of pamphlets and books, Dr. Black can truly be said to have accomplished more for dental science than any other one man. At the banquet in 1910 the guest of honor was called upon last, and in a characteristic, modest way, framed his thanks briefly to the men who had gathered to do him honor. In closing he gave expression to the chief thought that was in his mind, when he said that he did not have a good-bye for his friends, but rather a good-night. He said, though he had passed the mark of three score and ten, that he did not believe that his work was over—that there were many things in his mind that ought to be done, and that he hoped he might be able to do them. "I love the work I have been doing and I am not ready to quit." And so was given to him the years following that night to accomplish still other great things for the profession to which he had unsacrificingly devoted the best years of his life.

**A Leading Inventor.** In addition to his work as a writer and teacher, Dr. Black was an inventor, and it was he who designed and patented one of the first cord transmission dental engines. The present method of preparing cavities in teeth, and the methods of inserting and making gold and amalgam largely resulted from his investigations. For more than a quarter of a century he has stood pre-eminent as an original worker, and his name is known among dental and medical men the world over. For a period of ten years ending in 1880 he lectured on Pathology, both general and dental, in the Missouri Dental College in St. Louis. Subsequently, from 1886 to 1889, he lectured in the Chicago College of Dental Surgery; then he became identified with the dental department of the University of Iowa, from which position he was called to Northwestern University, and was made the Dean of the dental department in 1897.

Dr. Black was the first President of the State Board of Dental Examiners in Illinois; served as President of the Illinois Dental Society and the American Dental Association, and for a long period of years represented Northwestern University in the American Association of Dental Faculties. He was president of the section on pathology of the International Dental Congress during the World's Fair in St. Louis, also of the Panama-Pacific Congress, now in session in San Francisco.

He was awarded the first gold medal by the Dental Society of the State of New York for scientific research, and also the first Miller prize, the latter being a gold medal voted by the International Dental Federa-



## IN MEMORIAM

tion for the most valuable contributions to the literature and scientific advancement of the profession. Dr. F. Aguillar, of Madrid, was commissioned to come to Chicago to make the presentation in person.

Dr. Black was so wrapped up in his work, so intent on the great things that he was accomplishing, that he had no thought of material gain or personal aggrandizement. His purpose was to solve unsolved problems in science, to perfect methods and apparatus, and to develop theories that they should become practical aids to the dental profession and thus to humanity. His work was for all men, and with singular self-forgetfulness he gave unsparingly of his time and his great mentality for the world at large. While his work was such that he came to be a recognized dental authority the world over, his simple habits of life and the kindly approachableness of his manner never changed.

The stories of his deep and unassumed interest in young and struggling practitioners are many, and he had that quality of heart gentleness that marks many men who are really great. His long life has closed; he has not lived in vain, and no monument could be erected in his memory which could give half the glory to his name that will come through the years from the recollection of his work. The mere statement that he contributed largely to the text-books and literature of dentistry conveys little idea of how large his contributions have been in this line. A list of pamphlets and books from his pen was compiled several years ago, and occupied twenty pamphlet pages. He began writing in 1866, and from that time dental treatises came steadily from his pen, his activity in this line continuing until but a few months ago.

### **A Physician's CIBUTE.**

Referring to Dr. Black several years ago, an eminent physician in Illinois said: "In the history of a people, men are born whose wisdom and logic command attention, and they are chosen to guide the ship of state and to shape the destiny of a nation. The sons of Illinois have always been active in every field of human endeavor. In statesmanship, the name of the immortal Lincoln stands supreme. The lives of Grant and Logan have added lustre to the history of the State, and their fame is the nation's glory. The legal profession gave us Chief Justice Full'er. In theology, the logicians, David Swing and H. W. Thomas, were towers of strength. In medicine, the successful organizer and profound scholar, N. S. Davis, ranked among the foremost physicians of his time. In surgery, the incomparable Senn was the light of the world, a benefactor to mankind.

"On August 3, 1836, in Scott County, Ill., a boy was born who was destined to become a leader of men, to delve deep into unsolved problems,

and to bring blessings not only to the people of his time, but to all generations yet to be. Unmindful of his own well-being, and filled with the desire to alleviate human suffering, he worked day and night. The results of his efforts the world knows and appreciates. What Lincoln was in statesmanship; what Grant was at the head of the army; what Melville Fuller was as the Chief Justice of the United States; what N. S. Davis was in medicine; what the master surgeon, Senn, was in surgery, in the science and art of dentistry is that distinguished man, Dr. G. V. Black. In recognition of his services as a teacher, writer, investigator, scientist, and as a lover of humanity, we may place our wreaths of laurel at his feet."

Another said of him: "We need not discuss the work of Dr. Black, for, after all, the greatest achievement is that he has left his impress upon dentistry by the intellectual uplift he has given us in enabling us to understand and appreciate the scientific method as applied to our work. Dr. Black's life work is his honor, and we can but express our appreciation of what he has done for us and say, God bless him for what he has done, not only for the dental profession, but for the uplift, for the help, for the benefit that he has conferred upon humanity at large."

Dr. Black was given the degree of D.D.S. by Missouri Dental College in 1877. In 1884 he received the M.D. degree from the Chicago Medical College, and in 1892 Sc.D. from Illinois College, and LL.D. from Northwestern University in 1898.

As a man he was really the marvel of the age, for in his lifetime he accomplished more perhaps than can be accredited to any other one man in the dental profession. It was, indeed, a great day for dentistry when Dr. Black was born, and when one contemplates the vast amount of work that he has done, it seems almost beyond comprehension that so much was accomplished even through the long years of his devoted work.

The following are the leading events of the life and professional career of Dr. Greene Vardman Black as complied several years ago:

Born near Winchester, Scott County, Ill., August 3, 1836.

Family moved to farm seven miles southeast of Virginia, in Cass County, Ill., in 1845.

Attended country school about three months each winter.

Studied medicine with Dr. Thomas G. Black, a brother, at Clayton, Ill., 1853-1856.

Studied dentistry with Dr. J. C. Speer, Mt. Sterling, Ill., 1857.

Practiced dentistry at Winchester, Ill., 1858-1862.

Enlisted in 129th Illinois Volunteers, 1862.



In hospital at Louisville, Ky., six months, and discharged for disability 1863.

Practiced dentistry in Jacksonville, Ill., 1864-1870.

Joined Missouri Dental Society, 1866.

Joined Illinois State Dental Society, 1868.

First important dental paper on "Gold Foil" read before Illinois State Dental Society, 1869.

President Illinois State Dental Society, 1870-1871.

Invented one of the first cord-driven, foot-power dental engines, 1870.

Lectured on pathology, histology and operative dentistry, Missouri Dental College, 1870-1880.

First President of the Illinois State Board of Dental Examiners, 1881-1887.

Wrote book, "The Formation of Poisons of Micro-organisms," 1884.

Professor of Dental Pathology, Chicago College of Dental Surgery, 1883-1889.

Introduced teaching of dental technics, Chicago College of Dental Surgery, 1887.

Wrote for the American System of Dentistry, chapters on "General Pathology," "Dental Caries," "Pathology of Dental Pulp," and "Diseases of the Periodental Membrane," 1886.

Wrote book, "Periosteum and Periodental Membrane," 1887.

Voted life membership in Illinois State Dental Society, 1889.

Professor Dental Pathology and Bacteriology, dental department, University of Iowa, 1890-91.

Wrote book, "Descriptive Anatomy of the Human Teeth," 1891.

Wrote series of articles, entitled "The Management of Enamel Margins," *Dental Cosmos*, 1891.

Professor Dental Pathology and Bacteriology, Northwestern University Dental School, 1891-97.

Chairman of Section on Etiology, Pathology and Bacteriology, World's Columbian Dental Congress, 1893.

Report on Dental Nomenclature, World's Columbian Dental Congress, 1893.

Wrote series of articles, entitled "An Investigation of the Physical Characters of the Human Teeth in Relation to Their Diseases and to Practical Dental Operations, Together With the Physical Characters of Filling Materials," *Dental Cosmos*, 1895-96.

Dean and Professor of Operative Dentistry, Dental Pathology and Bacteriology, Northwestern University Dental School, 1897, to the time of his death.

President National Dental Association, 1900.

Awarded First Fellowship medal by the Dental Society of the State of New York, 1905.

Special guest at annual meeting of American Dental Society of Europe, 1906.

Wrote work on "Operative Dentistry," in two volumes, 1908.

Voted Miller prize for most valuable contribution to dental science and literature by the International Dental Federation, 1910.

Wrote book on "Special Dental Pathology, 1915.

At the cemetery, with a very simple service, Dr.

**Funeral Services.** Black was laid away for his long sleep in a grave massed with beautiful floral emblems testifying to the tender esteem of friends from near and far.

The honorary bearers were Dr. Edmund James, President of the University of Illinois; Dr. W. A. Harris, President of Northwestern University; Dr. J. H. Kennerly Dean of the dental department of Washington University in St. Louis; Dr. C. R. Koch and Dr. Edward Noyes, of Northwestern University; Dr. Thomas L. Gilmer, of the Northwestern Dental School, and a friend of Dr. Black since boyhood. The active bearers were Dr. E. F. Baker, representing local medical practitioners; W. E. Veitch, representing the Jacksonville Literary Union; Dr. C. B. Sawyer, representing the Jacksonville Dental Society; A. T. Capps, representing the family; Dr. George N. Kreider, long associated with the deceased, and Dr. Charles H. Rammekamp, representing Illinois College.

Flowers and floral emblems were sent in great profusion by friends of Dr. Black from a number of distant cities, and seldom, if ever, has such a display been seen in Jacksonville. The flowers were cared for by Mrs. W. T. Wilson, assisted by Dr. Josephine Milligan, Dr. Grace Dewey, Mrs. James O. Vosseller, Mrs. J. W. Walton, and Mrs. John H. Russell. The ushers were W. T. Wilson, Dr. W. B. Young, and Dr. W. L. Frank.

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### Dr. George W. Melotte.

Died, after a brief illness, July 25, 1915, George Melotte, M.D.S., of Ithaca, N. Y., in his eightieth year.

Dr. Melotte had been in failing health for some time, and was compelled to retire from active practice about eight years ago. Although the infirmities of advancing age were beginning to tell upon him, the sudden end, with only an hour's illness, was unexpected.

Born in Watertown, a son of Gabriel Melotte, a native of France, he was educated in the Jefferson County Institute, practiced his profes-



sion with Dr. S. M. Robinson, at Watertown, moved to Potsdam, where he practiced five years, coming from there to Ithaca in 1866.

In 1887 Dr. Melotte was awarded the title of Master of Dental Surgery by the N. Y. Board of Regents. He was a delegate of the United States to the International Medical Congress, section of dentistry, at Berlin in 1890, and there acted as a clinical demonstrator. While in Europe he gave clinics in Paris and London and before the British Dental Association at Exeter, demonstrating crown and bridgework. Just before his health broke he had accepted the appointment of dean of the Dental College of Iowa State University.

It was as an inventor of dental appliances that he became known throughout the dental world. This reputation was due to a natural mechanical talent. He gave to the dental world fusible metal and Melotte's mouldine. A company was formed and these inventions were placed upon the market through one of the largest dental supply houses in the country. For many years he was active in the Sixth District Dental Society.

In Ithaca he was a leader in several fraternal orders and in St. John's Episcopal Church. While in Potsdam he affiliated with Racquet River Lodge No. 213, F. and A. M., afterward transferring to Fidelity Lodge No. 51, in Ithaca, and joining Eagle Chapter No. 58, R. A. M., in 1867, St. Augustine Commandery No. 38, and Ithaca Lodge of Perfection. For nearly thirty years he was prelate of the commandery, and 1890 served as its eminent commander.

Said the *Weekly Ithacan*: "Dr. Melotte's practice in dental surgery was, in method and appliances, in advance of his time, his contributions to the profession winning him fame and favor throughout the State and nation.

"Dr. Melotte was a public-spirited, good and useful citizen. He was not only a leader in the professional life he had chosen, but was ever an uplift in the social, political and religious life of the community. There has been none like him, 'only one Dr. Melotte,' as has been truly said. He will be missed by those who knew him best."

From the *Elmira Telegram*: "He was one of the foremost dentists living until his health drove him to private life and from the world several years ago. He was by nature a gentleman. He was very high in Masonry and an intensely active and sincere Episcopalian. He had a heart as tender as a female saint and as big as a man can carry. Few men in Ithaca were held in such high esteem. He was a good man. 'God bless him.'"

He was also prominent in Odd Fellows' circles, having served as Noble Grand of Ithaca Lodge No. 71, and Chief Patriarch of Iroquois Encampment No. 16. In St. John's Episcopal Church he served for twenty-seven years as vestryman.

His funeral was conducted by St. Augustine Commandery No. 38.

Three daughters, Mrs. J. P. Hale Armstrong, of Minneapolis; Miss Julia L. Melotte and Miss Addie J. Melotte, of Ithaca, N. Y., survive.

F. M. WILLIS.





### **State Society Meetings.**

**ARIZONA STATE DENTAL SOCIETY**, Phoenix, Ariz., November, 1915.

Secretary, Dr. J. L. O'Connell, Phoenix, Arizona.

**OHIO STATE DENTAL SOCIETY**, Columbus, Ohio, December 7-9, 1915.

Secretary, Dr. F. R. Chapman, 305 Schultz Bldg., Columbus, Ohio.

**VIRGINIA STATE DENTAL ASSOCIATION**, Richmond, Va., Nov. 4-6, 1915.

Secretary, Dr. C. B. Gifford, Norfolk, Va.

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### **Northern Illinois Dental Society.**

The twenty-eighth annual meeting of the Northern Illinois Dental Society will be held the third Wednesday and Thursday of October in Freeport.

All dentists in Northern Illinois who have not been fortunate enough to have attended the Panama Pacific Dental Congress may find consolation in attending our meeting. Cross the days in your appointment books. Do it now.

H. F. BOWERS, Secretary.

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### **Lebanon Valley Dental Association.**

The fortieth annual meeting of the Lebanon Valley Dental Association will convene in Lebanon, Pa., on Tuesday and Wednesday, October 12th and 13th.

E. F. KREMER, D.D.S.

Chairman of Executive Committee.



## **Louisiana State Dental Society.**

At the thirty-seventh annual meeting of the Louisiana State Dental Society, held in New Orleans for the first time in seven years, the following members were elected to serve during the 1915-1916 term:

J. Hall LeBlanc, President; L. C. Dumpsey, First Vice-President; H. H. Hawsey, Second Vice-President; J. Crimen Zeidler, Recording Secretary; Robert L. Carter, Corresponding Secretary; O. J. Ory, Treasurer.

This meeting was the most auspicious and largest attended in the history of the organization, and much credit is due the retiring president, Dr. J. P. Wahl, for his untiring and zealous efforts, which were largely responsible for the success attained.

Lake Charles, Louisiana, was selected for the meeting place of the society in 1916.

DR. J. CRIMEN ZEIDLER, Secretary.

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## **Vermont State Dental Society.**

The Vermont State Dental Society held a very successful meeting in Burlington, Vt., May 19 and 20, 1915, at which the following officers were elected by the society:

Dr. W. H. Megoff, President, Montpelier; Dr. H. M. Smith, First Vice-President, Lyndonville; Dr. G. E. Partridge, Second Vice-President, Burlington; Dr. P. E. Mellen, Secretary, Middlebury; Dr. W. H. Munsill, Treasurer, Wells River.

Executive Committee—Dr. W. R. Pond, Rutland; Dr. David Manson, Burlington; Dr. P. M. Williams, Rutland.

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## **New Jersey State Board of Registration and Examination in Dentistry.**

The State Board of Registration and Examination in Dentistry of New Jersey will hold their semi-annual meeting and examination in the Assembly Chamber at the State House, Trenton, N. J., on December 6, 7, 8, and 9, 1915. License fee, \$25. Re-examination fee, \$10.

The following practical tests will be required: Insertion of an approximal gold filling, compound approximal amalgam filling, and a silicate filling, besides a practical test of the applicant's ability in oral prophylaxis. Also preparation of a cavity for an inlay with wax pattern. Prosthetic dentistry: Five-piece bridge and Richmond crown in addition

to an anatomical articulation of a full upper and lower set of teeth. Teeth to be furnished by applicant. Wax bites properly trimmed and in place on models for inspection before setting up teeth.

Attention is directed to the following requirements: "All applicants for a license to practice dentistry in New Jersey shall present to said board a certificate from the Superintendent of Public Instruction showing that before entering a dental college he or she had obtained an academic education, consisting of a four-years' course of study in an approved public or private high school, or the equivalent thereof." In accordance with the law, the Secretary will issue application blanks only upon presentation of the required certificate from the Superintendent of Public Instruction, Trenton, N. J.

Applications must be filed ten days before the date of the examination. Address all communications for further particulars to the Acting Secretary.

JOHN C. FORSYTH.

430 East State Street, Trenton, N. J.

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### **Maryland Board of Dental Examiners.**

The Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 4th and 5th, 1915, at the Baltimore College of Dental Surgery, Baltimore, at 9 A. M.

For application blanks and further information, apply to

F. F. DREW, Secretary.

701 N. Howard Street, Baltimore, Md.

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### **Notice of Registration.**

#### **To All Dentists Licensed in the State of Illinois.**

You are hereby notified to procure from O. H. Seifert, Secretary of the Illinois State Board of Dental Examiners, with offices located at 305-6-7 Ridgely Bldg., Springfield, Illinois, a renewal of your certificate of registration to practice dentistry in the State of Illinois from and after November 1, 1915, and until November 1, 1917, and that the fee therefor is \$1.00 (One Dollar), which must accompany the application for renewal.

You are further notified that unless you procure a renewal of your registration certificate on or before November 1, 1915, your license to practice dentistry in the State of Illinois will be revoked in accordance with the statute in such cases made and provided.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

O. H. SEIFERT, Secretary.

### Maine Board of Dental Examiners.

The Maine Board of Dental Examiners will hold an examination at the State House, Augusta, Maine, October 21, 22 and 23, 1915.

For application and information apply to Dr. I. E. Pendleton, 54 Pine Street, Lewiston, Me.

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### Michigan State Board of Dental Examiners.

The next regular meeting of the Michigan State Board of Dental Examiners, for the examination of applicants who wish to practice dentistry in Michigan, will be held at the dental college at Ann Arbor, beginning Monday, November 1, 1915, at 8:00 A. M., and continue through Saturday, November 6th.

For application blanks and full information apply to

A. W. HAIDLE, Secretary.

Negaunee, Mich.

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### American Institute of Dental Teachers.

At the last annual meeting of the American Institute of Dental Teachers, held at Ann Arbor, Michigan, the following officers were elected for the ensuing year: President, H. M. Semans, Columbus, Ohio; Vice-President, S. W. Bowles, Washington, D. C.; Secretary-Treasurer, J. F. Biddle, 517 Arch Street, N. S., Pittsburgh, Pa.; Executive Board, A. W. Thornton, Montreal, Canada; R. W. Bunting, Ann Arbor, Michigan; A. D. Black, Chicago, Ill.

The next annual meeting will be held at Minneapolis, Minnesota, January 25, 26, and 27, 1916.

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### Association of Military Dental Surgeons.

The annual meeting of the Association of Military Dental Surgeons will be held at San Francisco, September 1 and 2, 1915.

DR. WM. C. FISHER, President.

373 Fifth Avenue, New York City.